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Superfund Record of Decision:

General Motors/Central Foundry Division, NY

50272-101

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 270-acre General Motors/Central Foundry Division site is an active aluminum casting plant in Massena, St. Lawrence County, New York. The site is bordered by the St. Lawrence River to the north, the St. Regis River Mohawk Indian Reservation (which includes Turtle Creek) to the east, the Raquette River to the south, and a manufacturing facility to the west. Surrounding land use is mixed residential and industrial. The site overlies a surficial alluvial aquifer and is adjacent to wetlands, both of which have been contaminated. Additional onsite features of concern include the unlined North and East Disposal Areas and the Industrial Landfill, which contain contaminated soil, debris, sludge; four unlined Industrial Lagoons, which contain contaminated liquids, sludge, and soil; the rivers and creek which contains contaminated sediment; contaminated soil on the St. Regis Mohawk Reservation and on General Motors property; and contaminated associated wetlands. From 1959 to 1980, hydraulic fluids containing PCBs were used in the onsite aluminum casting operations. During the 1960's, PCB oil-laden wastewater was routinely discharged to one of the four industrial lagoons resulting in sludge buildup. Wastewaters were discharged to the St. Lawrence River. During the mid-1970's, the migration of water and sludge through a

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - General Motors/Central Foundry Division, NY
First Remedial Action
Contaminated Media: soil, sediment, sludge, debris, gw, sw
Key Contaminants: VOCs (TCE), other organics (PAHs, PCBs, phenols)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 207
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(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R02-91/131
General Motors/Central Foundry Division, NY
First Remedial Action

Abstract (Continued)

breached berm surrounding the East Disposal Area resulted in PCB contamination on the St. Regis Reservation and in Turtle Creek. Further contamination stemmed from the placement of PCB-contaminated soil on the bank of the Raquette River, as well as from discharge of surface water runoff from the site to the Raquette River. In 1976, a wastewater treatment system, which included a lagoon for solids settling was installed resulting in which created PCB-laden sludge buildup in the onsite lagoon. PCB-laden sludge from the lagoon was periodically removed to the East and North Disposal Areas and the Industrial Landfill. Solid industrial wastes were disposed of in the Industrial Landfill as well. Investigations by General Motors from 1985 to 1989 confirmed and characterized onsite and offsite contamination in soil, sediment, sludge, and ground water. As a result, in 1988 an interim cap was placed over the Industrial Landfill. This Record of Decision (ROD) provides a final remedy for all site areas and media except the East Disposal Area and the Industrial Landfill, which will be addressed in a subsequent ROD. The primary contaminants of concern affecting the soil, sediment, sludge, debris, ground water, and surface water are PCBs, and to a much lesser degree, VOCs including TCE; and other organics including PAHs, and phenols.

The selected remedial action for this site includes dredging and excavating approximately 62,000 cubic yards of contaminated soil and sediment from PCB "hot spots" in the St. Lawrence and Raquette rivers, Turtle Creek, and associated wetlands and riverbanks; excavating approximately 142,000 cubic yards of sludge, soil, and debris from the North Disposal Area and the four Industrial Lagoons (two of the four of the lagoons are inactive and will be remediated currently, the two active lagoons will be remediated after they are taken out of service); excavating approximately 49,000 cubic yards of soil from the Reservation and General Motors property; dewatering and treating dredged and excavated material using bioremediation, another equivalent treatment, or incineration based on treatability test results; disposing of residuals and material with low-level contamination onsite, placing a vegetated cap over the residuals; pumping and onsite treatment of contaminated ground water; discharging the treated water onsite to surface water; implementing interim surface runoff controls at the East Disposal Area; and monitoring sediment, ground water, and surface water. The estimated present worth cost for this remedial action is $78,000,000, which includes an annual O&M cost of $464,000 for years 0-8, $197,000 for years 9-10, $464,000 for years 11-13, and $197,000 for years 14-30.

PERFORMANCE STANDARDS OR GOALS: Excavation levels for PCB-contaminated materials are based on TSCA requirements and St. Regis Mohawk PCB clean-up requirements, and include 1 mg/kg (TSCA) for sediment in the St. Lawrence and Raquette Rivers, 1 mg/kg (St. Regis) for soil on the St. Regis Reservation, 0.1 mg/kg (St. Regis) for sediment in Turtle Creek, and 10 mg/kg (TSCA) for onsite soil and sludge on the General Motors facility. PCB-contaminated material will be treated to a level of 10 mg/kg or less. Phenols in onsite solids will be remediated to a level of 50 mg/kg. Ground water cleanup standards are based on State standards, and include TCE 5 ug/l, PCBs 0.1 ug/l, and phenols 1 ug/l.

ROD FACT SHEET

SITE

Name:	General Motors - Central Foundry Division (first operable unit)
Location:	Massena, St. Lawrence County, New York
HRS Score:	Group 5
NPL Rank:	350

ROD

Date Signed:	December 17, 1990
Remedy:	Dredging/excavation of sediments and soils in the St. Lawrence and Raquette Rivers and in Turtle Creek; excavation of sludges, soil and debris in the North Disposal area, in the four Industrial Lagoons, and in other areas on G.M. property; excavation of soil on St. Regis Mohawk Reservation land; treatment of dredged/excavated material by either biological treatment (or another innovative treatment technology which has been demonstrated to achieve site treatment goals) or thermal destruction to be determined following treatability testing; and downgradient groundwater recovery and treatment.
Capital Cost:	$ 84.8 million
O & M/Year:	$ 197,000 - $ 464,000 per year
Present Worth:	$ 78 million

LEAD

Potentially Responsible Party

Contact:	Lisa Carson, (212) 264-6857
Main PRP:	General Motors Corporation

WASTE

Type:	PCBs, phenols, PAHs
Media:	Sediments, soil, sludges, and groundwater
Origin:	On-site disposal of PCBs used in hydraulic fluids
Est. Quantity:	Approximately 253,000 cubic yards of PCB contaminated material addressed in this ROD

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

General Motors Corporation - Central Foundry Division Site
Massena, St. Lawrence County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the General Motors - Central Foundry Division Superfund Site, in Massena, New York, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendment and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the first operable unit remedy for this Site.

The New York State Department of Environmental Conservation (NYSDEC) and the St. Regis Mohawk Tribe concur on the selected remedy. Letters of concurrence from NYSDEC and the St. Regis Mohawk Tribe are appended to this document.

The information supporting this remedial action decision is contained in the Administrative Record for this Site.

ASSESSMENT OF THE SITE

Certain actual or threatened releases of hazardous substances at or from this Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This action or "operable unit" is the first of two operable units that are planned for the Site. This operable unit addresses several of the principal threats at the Site by treating contaminated river system sediments and sludges, soil, and groundwater at the Site. The second operable unit will address the threats resulting from the East Disposal Area and the Industrial Landfill at the Site.

The major components of the selected remedy include:

- Dredging and excavation of sediments and soils from polychlorinated biphenyl (PCB) contaminated areas in the St. Lawrence and Raquette Rivers, Turtle Creek, and associated riverbanks and wetlands;

- Interim surface runoff control to prevent migration of contamination from the East Disposal Area;

- Excavation of PCB contaminated sludges, soil, and debris in the North Disposal Area, in and around the four Industrial Lagoons, and in other areas on General Motors (G.M.) property (two of the four lagoons, which are currently in use by G.M., will be remediated when they are taken out of service);

- Excavation of PCB contaminated soil on St. Regis Mohawk Reservation land adjacent to the G.M. facility;

- Recovery and treatment of groundwater downgradient from the Site with discharge of treated groundwater to the St. Lawrence River; and

- Treatment of dredged/excavated material by either biological treatment (or another innovative treatment technology which has been demonstrated to achieve site treatment goals) or thermal destruction to be determined by the U. S. Environmental Protection Agency (EPA) following treatability testing. Treatment residuals will be disposed on-site. Other innovative PCB treatment technologies will be tested concurrently with biological treatment so that EPA will have additional information in the event that biological treatment proves to be unsatisfactory for treatment of any Site material. EPA will select the treatment technologies to be employed, in consultation with NYSDEC and the St. Regis Mohawk Tribe.

DECLARATION

The selected remedy is protective of human health and the environment, complies with Federal, State and Tribal requirements that are legally applicable or relevant and appropriate to the remedial action (or provides grounds for invoking a waiver of these requirements), and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies which employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on-site above health-based levels in the active Industrial Lagoons until they are taken out of service, a review will be conducted within at least five years after commencement of

remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Constantine Sidamon-Eristoff
Regional Administrator
U. S. Environmental Protection Agency

December 17, 1990
Date

DECISION SUMMARY

GENERAL MOTORS - CENTRAL FOUNDRY DIVISION SITE

MASSENA, NEW YORK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

NEW YORK

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ATTACHMENTS

SITE NAME, LOCATION, AND DESCRIPTION

The General Motors - Central Foundry Division (G.M.) Site is located on Rooseveltown Road in St. Lawrence County in Massena, New York. The Site consists of several waste areas at an active G.M. manufacturing facility along with contaminated soils on G.M.'s property and on the St. Regis Mohawk Reservation, contaminated sediments in the St. Lawrence and Raquette Rivers and in Turtle Creek, associated riverbanks and wetlands, and contaminated groundwater. Because the Mohawk people have a cultural and spiritual link to the St. Lawrence region, which they call Akwesasne, special consideration must be given to Native American concerns in evaluating and remediating the Site.

The G.M. facility is bordered on the north by the St. Lawrence River, on the east by the St. Regis Mohawk Indian Reservation, on the south by the Raquette River and on the west by the Reynolds Metals Company and property owned by Conrail (see Figure 1). Land use in the area surrounding the Site consists of mixed residential and industrial uses. The Reynolds Metals Company facility and another facility west of the Site owned by the Aluminum Company of America are presently under investigation by the U. S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC). The nearest residence is located on the St. Regis Mohawk Indian Reservation approximately 300 feet from the G.M. facility boundary. St. Lawrence River flows are partially controlled by the Moses-Saunders Power Dam, located approximately four miles upstream from the Site.

The G.M. facility consists of approximately 270 acres of industrial and undeveloped land. Wetlands lie east of the facility in the area surrounding Turtle Creek. There are no federally listed endangered or threatened species known to inhabit the St. Lawrence River. However, the River does support a number of New York State listed endangered, threatened and special concern fish species. The River and adjacent habitats also provide nesting for a variety of water birds and shorebirds. Federally listed endangered falcons and bald eagles have been reported in the Massena area.

The Site, as defined by EPA, consists of several major areas which are depicted schematically in Figure 2. The North and East Disposal Areas and the Industrial Landfill contain soil, debris, and sludge. The four unlined Industrial Lagoons contain liquids, sludges, and solids and are referred to as the 350,000 gallon, 500,000 gallon, 1.5 million gallon and 10 million gallon lagoons. The Site also includes contaminated sediments, riverbanks, and associated wetlands of the St. Lawrence River, the Raquette River and Turtle Creek (formerly called the unnamed tributary on the St. Regis Mohawk Reservation), contaminated soil on the St. Regis Mohawk Indian Reservation, contaminated soil on G.M. property not

associated with the specific disposal areas already mentioned, and contaminated groundwater.

Groundwater flow generally reflects surface topography and flows north toward the St. Lawrence River and northeast to Turtle Creek. Turtle Creek and the adjacent wetlands serve as discharge areas for shallow groundwater flow. There is also some limited shallow groundwater flow south toward the Raquette River. A few residents on Raquette Point rely on groundwater as a drinking water supply. The remainder of the Raquette Point residents obtain water from a public water supply system which has its intake in the St. Lawrence River at the mouth of the Raquette River, approximately 1.5 miles downriver from the G.M. facility.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

G.M. has operated an aluminum casting plant at the Site since 1959. Until 1980, polychlorinated biphenyls (PCBs) were a component of hydraulic fluids used in diecasting machines at the G.M. facility. PCBs provided protection against fire and thermal degradation in the high temperature environment of the diecasting machines. G.M. no longer uses the diecasting process at the facility.

In the early 1960's, wastewater containing PCB-laden oil passed through the 1.5 million gallon lagoon and then to the St. Lawrence River. In 1968-1969, a lined interceptor lagoon was added adjacent to the 1.5 million gallon lagoon. This lined lagoon was subsequently buried and is considered by EPA to be a part of the North Disposal Area. In 1976, a wastewater treatment system was installed at the plant. In that system, wastewater was sent to the 350,000 gallon lagoon for solids settling. Treated water was pumped to the 500,000 gallon and 10 million gallon lagoons for reuse as plant process water. Periodically, water was discharged to the St. Lawrence River from the 1.5 million gallon lagoon. The 1.5 million gallon lagoon was not used for settling after 1976; however, water passed through the 1.5 million gallon lagoon, which contained PCB sludges, prior to discharge to the St. Lawrence River after 1976. After further modifications to G.M.'s wastewater treatment process, the 350,000 gallon lagoon was taken out of service in 1980. All four lagoons are subject to regulation under the Toxic Substances Control Act (TSCA) because they were part of G.M.'s wastewater process after February 17, 1978, the date the TSCA PCB regulations became effective.

During operations, PCB laden sludge from the 1.5 million gallon lagoon and from the wastewater treatment plant was periodically removed to the North and East Disposal areas and to the Industrial Landfill. The Industrial Landfill has also received foundry sand, soil and concrete excavated during plant construction, diecasting machines, and solid industrial waste.

The Landfill was covered with an interim cap in 1988. The North Disposal Area also received construction debris, soil and tree stumps. The East Disposal Area contains soil and sludge along with construction debris. The North and East Disposal Areas and the Industrial Landfill were not lined.

In 1975, a berm surrounding the East Disposal Area was breached. Water and sludge flowed east to the St. Regis Mohawk Reservation and to Turtle Creek. Visible spill material was removed from the Reservation to G.M. property. In 1970, PCB contaminated soil excavated during plant expansion was placed on the north bank of the Raquette River. In addition, G.M. discharged surface water runoff to the Raquette River until 1989 under a State Pollution Discharge Elimination System (SPDES) permit.

The G.M. Site was placed on the Superfund National Priorities List ("NPL") in September 1983 as a result of G.M.'s past waste disposal practices. G.M. indicated a willingness to perform the Remedial Investigation and Feasibility Study (RI/FS) for the Site. On April 16, 1985, EPA and G.M. entered into an Administrative Order on Consent (Index No. II CERCLA-50201) for G.M.'s performance of the RI/FS. Draft and Phase II RI reports were submitted to EPA in May 1986 and May 1988, respectively.

G.M. performed additional river sampling in February 1989, and submitted a report on the additional sampling to EPA in May 1989. On June 9, 1989, EPA approved the RI report, which consists of the draft RI report, the Phase II RI report and the sediment sampling report, for the Site. The RI report delineated those areas in need of remediation throughout the Site. G.M. submitted the draft FS report to EPA in November 1989.

G.M. also entered into a 1985 Consent Order with EPA under the authority of TSCA. In addition to payment of penalties for failure to comply with certain TSCA regulations, G.M. agreed to close an abandoned pump house on-site.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The FS and Proposed Plan for the G.M. Site were released to the public in March 1990. These documents, along with the RI, were made available to the public in information repositories maintained at EPA Region II offices in New York city, at the Massena Public Library, and at the St. Regis Mohawk Tribal Building. The notice of availability of these documents was published in the Massena Daily Courier-Observer on March 21, 1990. A public comment period was held from March 21, 1990 through June 18, 1990. The public comment period was extended once upon the request of the St. Regis Mohawk Tribe.

A public meeting was held on April 25, 1990. At this meeting, representatives from EPA answered questions and received comments on EPA's Proposed Plan and the other remedial alternatives under consideration. In addition, a public availability session was held in Massena on April 26, 1990. The public availability session was an additional informal opportunity for the public to ask questions or comment on EPA's Proposed Plan. On May 9, 1990, EPA met with representatives of the Public Advisory Committee (PAC) in Cornwall, Ontario, Canada to receive the PAC's comments on EPA's Proposed Plan.

A response to comments received during the public comment period is included in the Responsiveness Summary which is part of this Record of Decision (ROD). The Responsiveness Summary and ROD, along with the Administrative Record for the Site are available at the information repositories referenced above.

SCOPE AND ROLE OF RESPONSE ACTION

EPA has organized the work at the Site into two operable units. This ROD for operable unit one presents the selected remedy for the contaminated sediments, contaminated groundwater, soils on the G.M. facility and on the Reservation, and material in the Industrial Lagoons and the North Disposal Area at the Site. Operable unit two, which will be the subject of a separate ROD, will address the East Disposal Area and Industrial Landfill. Initially, a second operable unit was required so that EPA could reevaluate Industrial Landfill data and better factor community concerns into its decision-making process for the Industrial Landfill.

EPA has deferred its remedial decision for the East Disposal Area to the second operable unit in order to evaluate the impact and applicability of new EPA guidance on Superfund sites which are contaminated with PCBs ("Guidance on Remedial Actions for Superfund Sites with PCB Contamination," OSWER Directive 9355.4-01, August 1990). This guidance was issued following the public comment period for the G.M. Site and, while it does not affect the remedy selected in this ROD for other Site areas, it may affect EPA's remedy selection for the East Disposal Area and the Industrial Landfill. Specifically, this guidance recommends that, when considering cleanup of areas which contain large volumes of PCB contaminated material (like the East Disposal Area and the Industrial Landfill), a cleanup alternative which combines treatment of highly contaminated material with containment of less contaminated material be evaluated. EPA will evaluate such an alternative in the coming months and plans to issue a second operable ROD which addresses remediation of the East Disposal Area and the Industrial Landfill in early 1991. In order to expedite site cleanup, the second operable unit remedy for the East Disposal Area and the Industrial Landfill will be consistent with the remedy selected in this document.

The remediation of the entire G.M. Site will be complete only after EPA has selected and implemented remedial actions for both operable units. The final remediation of the Site is intended to address the entire Site with regard to the principal threats to human health and the environment posed by the Site. The findings of the Risk Assessment are summarized in a later section of this document.

SUMMARY OF SITE CHARACTERISTICS

Contaminant Characteristics

Based on sampling and analyses conducted during the RI/FS, there are four major contaminants at the G.M. Site - PCBs, polyaromatic hydrocarbons (PAHs), phenols and volatile organic compounds (VOCs). At the G.M. Site, PAHs, phenols, and VOCs were found at much lower concentrations and in fewer samples than PCBs. Therefore, the primary contaminant of concern at the Site is PCBs. In addition, any method of treatment selected for the Site will also treat PAHs, phenols, and VOCs. For these reasons, PCBs have, in most cases, driven the remedy selection at this Site, although EPA intends to address all contaminants during the cleanup of the Site.

PCBs tend to bioaccumulate in human and animal fatty tissue and are classified by EPA as probable human carcinogens. The major target organs of PCB exposure are the liver and skin. Occupational exposure to relatively high concentrations of PCBs have resulted in changes in blood levels of liver enzymes and skin effects such as chloracne. PCBs have produced liver tumors in laboratory studies of rats. In addition, PCBs cause adverse reproductive effects in laboratory animals at low levels and may cause similar results in humans.

Affected Media

This section summarizes the quantities and types of contamination found in each area of the Site under consideration for this operable unit. Table 1 summarizes the volume of contaminated soil, sludge, and sediments associated with various cleanup levels for the Site. Table 2 summarizes the types of contaminants and their concentrations in several areas of the Site.

Contaminated River and Creek Sediments

Over 62,000 cubic yards of contaminated river sediments and soil with PCB concentrations above 1 part per million (ppm) are located in and along the St. Lawrence River, Raquette River and Turtle Creek ("the river system"). The majority of the contaminated sediments are within the St. Lawrence River (currently estimated at 56,000 cubic yards). The area of the

Raquette River impacted by the Site includes a currently estimated 6,000 cubic yards of soil and sediments located on the northern bank of the River and in the river near the former G.M. outfall. There are additional soils and sediments in and around Turtle Creek which are contaminated with PCBs at levels above 0.1 ppm. These soils are not included in the estimated volume of sediments and soils given above and may significantly increase this estimate.

The highest PCB concentration detected in St. Lawrence River sediments is 5,700 ppm. The highest PCB concentrations detected in the Raquette River area and in Turtle Creek are 390 ppm and 48 ppm, respectively. PAHs were also detected in St. Lawrence River sediments adjacent to the G.M. facility at levels up to 8 ppm. In addition, NYSDEC has detected total PCB concentrations as high as 36 ppm in the Raquette River with at least four additional samples above 5 ppm PCBs.

North Disposal Area, Contaminated Soil On the St. Regis Mohawk Reservation, Contaminated Soil On G.M. Property

The North Disposal Area consists of approximately 51,000 cubic yards of soil, debris and sludge with PCB concentrations greater than 10 ppm. This area includes a buried interceptor lagoon located adjacent to the 1.5 million gallon lagoon. The highest PCB concentration detected in the North Disposal Area is 31,000 ppm. Phenols were detected in three North Disposal Area samples with a maximum phenol concentration of 5,000 ppm. Fifteen different VOCs were detected sporadically in North Disposal Area subsurface soil with maximum concentrations of perchloroethylene (PCE) at 800 parts per billion (ppb) and of vinyl chloride at 158 ppb.

There are approximately 15,000 cubic yards of soil on the St. Regis Mohawk Indian Reservation contaminated with PCBs at concentrations above 1 ppm. The highest PCB concentration detected on the Reservation during the RI/FS is 48 ppm. In addition, NYSDEC has detected total PCB concentrations as high as 3,101 ppm in Turtle Creek with at least four additional samples above 100 ppm PCBs. There are also approximately 34,000 cubic yards of soil in various areas on the G.M. property which are contaminated with PCBs at concentrations greater than 10 ppm.

Industrial Lagoons

The status of the lagoons and the volumes of lagoon material with PCB concentrations greater than 10 ppm are as follows:

Lagoon	Volume	Status
350,000 gallon	4,000 yd^3	Inactive
500,000 gallon	2,000 yd^3	Active
1.5 million gallon	16,000 yd^3	Inactive
10 million gallon	69,000 yd^3	Active
TOTAL	91,000 yd^3	

The highest PCB concentration detected in the lagoon sediments was 750 ppm (detected in the 1.5 million gallon lagoon). The highest PCB level detected in the 350,000 gallon lagoon was 700 ppm, while the highest PCB level detected in the 500,000 gallon lagoon was 383 ppm. The highest PCB level detected in the 10 million gallon lagoon was 300 ppm. The highest phenol concentration (detected in the 350,000 gallon lagoon) was 26,200 ppm. VOCs and metals were also detected at levels above background, with the highest levels generally detected in the 350,000 gallon lagoon.

The two inactive lagoons, the 350,000 gallon lagoon and the 1.5 million gallon lagoon, contain precipitation and process water from past plant operations. The two active lagoons, the 500,000 gallon lagoon and the 10 million gallon lagoon, contain treated process water which is reused daily in the G.M. process.

Groundwater

PCBs were detected at concentrations up to 1.3 ppm in groundwater associated with the Site. VOCs were also detected in some groundwater samples with maximum vinyl chloride, dichloroethylene, and trichloroethylene concentrations of 50 ppb, 686 ppb and 50 ppb, respectively. The highest levels of PCB and VOC contamination were detected in samples of groundwater downgradient of the Industrial Landfill.

Potential Routes of Migration and Exposure

Contamination may migrate from surface areas into groundwater, surface water, and off the G.M. facility. The volatilization of PCBs is also a potential route of exposure. PCBs carried in surface water runoff may migrate to the Reservation. In addition, PCBs in the river system may be ingested by aquatic organisms and begin to bioaccumulate within the food chain. Therefore, one potential pathway of human exposure is human consumption of PCBs in the fatty tissue of fish and wildlife.

SUMMARY OF SITE RISKS

The qualitative and quantitative information on risks to human health presented in this section is based on EPA's baseline risk assessment for the G.M. Site which, in turn, was based on the Superfund Public Health Evaluation Manual. Qualitative information on environmental risks is based on a recent study of contaminants in fish performed by NYSDEC and the St. Regis Mohawk Tribe and preliminary natural resource surveys performed by NYSDEC, the St. Regis Mohawk Tribe, the U.S. Department of the Interior, and the National Oceanic and Atmospheric Administration.

Contaminant Identification and Exposure Assessment

Because PCBs are the primary contaminant of concern at the G.M. Site, EPA's baseline risk assessment for the Site reviewed the human health risks resulting from exposure to PCBs in soils, sediments, and groundwater. The potential routes of human exposure to Site contamination are the ingestion of fish and wildlife containing PCBs, ingestion of drinking water (potential future exposure route), ingestion of and dermal contact with PCB contaminated soil, infant ingestion of breast milk, inhalation of dust, and dermal contact while swimming. Two potential exposure routes, inhalation of dust and dermal contact while swimming, were not evaluated quantitatively in EPA's risk assessment because these routes were expected to be relatively minor compared to the other routes of exposure considered for the Site. Exposed populations include the residents of the St. Regis Mohawk Indian Reservation, Canadians who are downriver of the Site, and G.M. workers.

A major assumption of the EPA risk assessment was that the Site would not be developed for residential uses. In addition, because the St. Regis Mohawk Indian Reservation contains the closest residential population to the Site, the St. Regis Mohawk Tribe was considered the exposed population for the purposes of calculating exposure assumptions in EPA's risk assessment. Table 3 presents the exposure assumptions and the exposures used by EPA in its baseline risk assessment.

Toxicity Assessment

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes

underestimation of the actual cancer risks unlikely. CPFs are derived from the results of human epidemiological studies or chronic bioassays to which animal-to-human extrapolation and uncertainty factors have been applied. The CPF value for PCBs is 7.7 $(mg/kg\text{-}day)^{-1}$. This value was calculated for the oral route of exposure but was used in EPA's risk assessment for all routes due to a lack of other CPF values.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur. The current RfD value for PCBs is 0.0001 mg/kg-day. EPA is in the process of reviewing the RfD for PCBs.

Human Health Risk Characterization

Excess lifetime cancer risks for the Site were determined by multiplying the intake levels (given in Table 3) with the CPF for PCBs, 7.7 $(mg/kg\text{-}day)^{-1}$. These risks are probabilities that are expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that as a plausible upper bound, an individual has an additional one in one million chance of developing cancer as a result of site-related exposure to PCBs over a 70-year lifetime under the specific exposure conditions presented at the Site.

Table 4 presents a summary of the total carcinogenic risks and the carcinogenic risks posed by each exposure pathway for residents of the St. Regis Mohawk Tribe. It should be noted that the risks from ingestion of fish and wildlife are much greater than the risks associated with the other exposure pathways evaluated.

The potential risk of noncarcinogenic effects of PCBs in a single medium is expressed as the hazard index (HI) (or the ratio of the intake level for a given medium, given in Table 3, to the RfD for PCBs, 0.0001 mg/kg-day). The total HI was generated by adding the HIs across all media. The HI provides a useful reference point for gauging the potential significance of PCB exposures across all media.

Table 5 presents a summary of the total HI and the HIs posed by each exposure pathway for residents of the St.Regis Mohawk Tribe. Again, the noncarcinogenic effects associated with ingestion of fish and wildlife are much greater than the effects associated with the other pathways evaluated.

There were several uncertainties in EPA's risk assessment, which are primarily a result of assumptions made as part of the exposure assessment described above. For instance, data on the eating, hunting, and fishing habits of the Reservation population were based on a case study using an unstructured interview questionnaire of key informants rather than on a large-scale random sample statistical survey of the entire Reservation population. Data on fish and wildlife PCB concentrations were limited and were restricted to fish from waters near the Reservation. Historical data showing surface water contamination in the St. Lawrence River were used despite the fact that more recent data from the Reservation did not indicate PCB contamination. Standard uncertainties exist with respect to adult soil ingestion rates.

The estimation of health risks involves many uncertainties. Given these uncertainties, EPA used conservative assumptions (i.e., assumptions that protect human health) throughout its risk assessment. As a result, EPA's risk assessment provides an estimate of the risks to the Mohawk population from exposures that are reasonably expected to occur under current conditions and during and after remediation of the Site.

Environmental Risks

EPA, NYSDEC, the St. Regis Mohawk Tribe and Natural Resource Trustees are continuing to assess the risks posed to the environment by the Site. Ongoing studies by NYSDEC and the St. Regis Mohawk Tribe will assess the risks to wildlife posed by the Site.

NYSDEC and the St. Regis Mohawk Tribe, in a recent study of PCB concentrations in area fish reached the following conclusions:

- the river area adjacent to the G.M. Site is one principal PCB source area as reflected by concentrations in fish;
- relatively high concentrations of polychlorinated dibenzofurans (PCDFs) were present in fish from the mouth of Turtle Creek; and
- PCB, dioxin, and mercury exceeded the criteria for fish-eating wildlife in the study area.

Based on the currently available information, there are presently unquantified risks to the environment from the Site. This ROD may only partially address these risks. Given the presence of PCBs in the river system, New York State listed endangered, threatened and special concern fish species may be impacted by the Site. PCBs have been detected in area wildlife and in wetlands which provide habitat for water birds and other wildlife.

New York State, the St. Regis Mohawk Tribe, the U.S. Department of Commerce, and the U.S. Department of the Interior are each natural resource trustees pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) with trustee interests in the river system and environs as a result of the impacts noted in this ROD as well as other impacts to natural resources which have been observed. The trustees are currently in the preliminary stages of the natural resource damage assessment process.

Risk Summary

Certain actual or threatened releases of hazardous substances at or from the Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF ALTERNATIVES

Remedial alternatives are presented in this section for each area of the Site. Because many of the alternatives include PCB treatment, a discussion of PCB treatment technologies is presented as an introduction. This is followed by a discussion of cleanup levels selected by EPA for this Site.

Treatment Technologies

Six methods of treatment for Site soil, sludges and sediments were examined: biological destruction, chemical destruction, chemical extraction, thermal destruction (incineration), thermal extraction and solidification. Each of these treatment technologies has been tested at other hazardous waste sites. Although some have been found to be effective in treating PCBs, each technology, with the exception of thermal destruction, would require a pilot or field testing program before full-scale use at this Site. Thermal destruction would require trial incinerator burns to establish operating conditions.

Biological Treatment

Biological destruction of PCBs using naturally occurring or scientifically engineered bacteria was determined to be a

feasible alternative for the remediation of contaminated soils, sediments, and sludges at the Site. For this Site, biological treatment would involve processing excavated soils and sludges or dredged sediment in slurry form in above-ground batch reactors. Preprocessing would be necessary to remove bulky items. Bacteria and nutrients would be added to the tanks and the tanks would be mechanically aerated and agitated. The bacteria would degrade PCBs to nonhazardous products. Preliminary bench-scale tests of Site soil by G.M. have demonstrated up to 63% reduction of PCBs, from 291 ppm to 108 ppm, after three days of biological treatment.

Because biological treatment would be performed on material in slurry form, a large quantity of water will be produced during treatment and during subsequent dewatering operations. This water would be discharged to the St. Lawrence River in compliance with SPDES requirements which currently require that PCB concentrations in the discharge be non-detectable, down to the method detection level, using EPA Laboratory Method Number 608. Because PCB volatilization is a concern, if necessary, the reactors would be covered or fitted with emissions control equipment. Major applicable or relevant and appropriate requirements for biological treatment are federal Clean Air Act (CAA) and New York State air quality standards along with Resource Conservation and Recovery Act (RCRA) hazardous waste treatment regulations and TSCA disposal requirements.

Biological treatment is an innovative technology. Approximately one year would be required for preliminary testing and technology development. In addition, biological treatment may not sufficiently reduce PCB concentrations in those materials with initially high PCB concentrations.

Chemical Destruction

This technology employs a chemical dechlorination process to treat contaminated soils, sludges, and sediments. In the proprietary KPEG process, PCB-contaminated materials are reacted with a reagent, potassium polyethylene glycol or a similar chemical to remove the chlorine atoms from PCBs. If successful, this process converts PCBs to a glycol-like compound which is less toxic than PCBs. Full-scale process equipment is currently available.

For this Site, chemical dechlorination would be performed in a batch mixed reactor at approximately 300°F with an excess of reagent. The vendor of this process indicates that residual PCB concentrations as low as 2 ppm are achievable. Preprocessing is necessary to remove bulky items. Water, used to wash treated solids, would be discharged to the St. Lawrence River in compliance with SPDES requirements. Because PCB volatilization is a concern, if necessary, the reactors would be covered or

fitted with emissions control equipment. Major applicable or relevant and appropriate requirements for chemical destruction are federal CAA and New York State air quality standards along with RCRA hazardous waste treatment regulations and TSCA disposal requirements.

Chemical Extraction

Chemical extraction is based on the proprietary B.E.S.T. (Basic Extractive Sludge Treatment) process. Other similar processes are also available. This technology involves concentrating PCBs found in large volumes of solids and sludges into smaller volumes of an oily extract through the use of triethylamine, a solvent. The PCB rich extract must then be disposed. Preprocessing is necessary to remove bulky items. Full-scale process equipment is currently available.

The vendor reports that solids residual concentrations less than 0.1 ppm PCB are possible. Tests on sludge showed PCB concentrations of 130 ppm in treated sludge with an initial PCB concentration of 5800 ppm.

Process water would be treated and discharged to the St. Lawrence River in compliance with SPDES requirements. Major applicable or relevant and appropriate requirements for chemical extraction are TSCA disposal requirements and RCRA hazardous waste treatment regulations. The PCB extract would be treated and disposed on-site or transported off-site for disposal, if necessary.

Thermal Destruction

Thermal destruction technology involves the incineration of solid material. After material processing, sorting and, if necessary, dewatering, solids and sludges are fed to the incinerator. A rotary kiln incinerator was used to develop cost estimates, however, the particular type of incinerator to be used would be determined during design. Incinerators are commercially available and have achieved the 99.9999% destruction removal efficiency required by TSCA.

Scrubber water would be treated and discharged to the St. Lawrence River in compliance with SPDES requirements. Major applicable or relevant and appropriate requirements for thermal destruction are TSCA and RCRA incineration and disposal requirements, and CAA requirements. Incinerator ash would be tested and, if found to be non-hazardous, backfilled on-site.

Thermal Extraction

Thermal extraction involves the removal of organics from a solid or sludge waste stream under lower temperature conditions than those of incineration. The organic contaminants are not

destroyed during this extraction process; rather another treatment process would be necessary to permanently destroy the liquid PCB extract. Full-scale experimental and pilot-scale thermal extraction units are available. Vendor pilot studies have reduced PCBs from an initial concentration of 18,000 ppm to less than 0.1 ppm.

Scrubber water would be treated and discharged to the St. Lawrence River in compliance with SPDES requirements. Major applicable or relevant and appropriate requirements for thermal extraction are TSCA disposal requirements, RCRA treatment requirements, and CAA requirements. The PCB extract would be treated and disposed on-site or transported off-site for disposal, if necessary.

Solidification

Solidification of the excavated material involves the physical encapsulation, chemical reaction, or both, of the excavated material. A commercially available additive is mixed with the waste to create a slurry which is allowed to harden to a solid material. This solid material can then be disposed. Solidification is used to limit the leachability, or "leaking", of the PCBs into the environment. There is no data on destruction of PCBs during the solidification process.

Because PCB volatilization during solidification is a concern, if necessary, emissions control equipment would be required. Major applicable or relevant and appropriate requirements for solidification are CAA and New York State air quality standards along with TSCA and RCRA disposal requirements. Solidified material would require cover and long-term maintenance since PCBs would not be permanently destroyed.

The treatment options discussed above can be used separately or in combination with each other to treat soils, sludges and sediments at the Site. For example, because biological treatment may not be effective on highly concentrated wastes, EPA has evaluated a mixed treatment alternative which involves incineration of material contaminated with PCBs over 500 ppm and biological treatment of material with PCB concentrations below 500 ppm.

Cleanup Levels for the Site

EPA has chosen cleanup levels and treatment levels for PCBs and other chemicals at this Site. Cleanup levels are those levels which must be met in the river system and in soil and groundwater at the Site once remediation is completed. Treatment levels are those levels which must be met in the residual of any treatment process which is employed to remediate the Site. Site cleanup

levels and treatment levels for all contaminants of concern are specified in Table 6.

EPA has selected a soil PCB cleanup level of 1 ppm on the St. Regis Mohawk Indian Reservation. This level is based on applicable St. Regis Mohawk regulations which specify a soil cleanup level of 1 ppm PCBs and on the EPA recommended PCB soil action level of 1 ppm for residential areas as given in the August 1990 PCB guidance referred to earlier. EPA estimates that there are 15,000 cubic yards of soil with PCB concentrations above 1 ppm on the St. Regis Mohawk Reservation. Reservation soil which is excavated, treated, and disposed on G.M. property must have PCB concentrations less than or equal to 10 ppm prior to disposal. This treatment level is based on the cleanup and treatment levels selected by EPA for soil/sludge on the G.M. facility, as described below. This is appropriate because contaminated soil from the Reservation would be deposited on the G.M. facility after treatment. Because the cleanup levels and treatment levels for Reservation soils are not identical, Reservation soil with PCB concentrations above 1 ppm and below 10 ppm would not require treatment prior to disposal on the G.M. facility.

EPA has selected a soil/sludge PCB cleanup level of 10 ppm on the G.M. facility. This level is based, in part, on EPA's risk assessment for the alternatives considered for the Site which indicates that 10 ppm is protective of the Mohawk population and, in part, on the August 1990 PCB guidance which recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to remediated areas will be unlimited to G.M. personnel and because contaminants in on-site soils impact groundwater and surface water quality. EPA has selected a soil/sludge total phenols cleanup level of 50 ppm based on federal RCRA guidance for closure of surface impoundments. EPA estimates that there are 176,000 cubic yards of soils and sludges in the Industrial Lagoons, in the North Disposal Area, and in other areas on the G.M. facility contaminated with PCBs above 10 ppm which are being addressed in this operable unit. In general, the treatment levels for soil/sludge on the G.M. facility (see Table 6) are consistent with the cleanup levels for the G.M. facility. This is appropriate because treated soil would be deposited on the G.M. facility after treatment.

The groundwater PCB cleanup goal selected by EPA is 0.1 ppb, as measured at the boundary of the Industrial Landfill and Industrial Lagoons, based on New York State requirements. This level is lower than the proposed federal maximum contaminant level of 0.5 ppb. Because PCBs sorb to soil, the effectiveness of PCB removal from the groundwater aquifer may be limited. The phenol groundwater cleanup level is 1 ppb based on New York State requirements. The EPA cleanup levels for VOCs shown in Table 6

are based on federal and State requirements which are either applicable or relevant and appropriate for the Site. Groundwater would be treated to comply with SPDES requirements before it would be discharged to the St. Lawrence River. The treatment levels for groundwater are given in Table 6. These levels are based on New York State SPDES requirements which regulate the levels of contaminants which may be discharged to the waters of New York State. This is appropriate since groundwater will be discharged to the St. Lawrence River following treatment.

EPA's selected remedy for river sediments requires the delineation of areas in the river system which are severely contaminated, called PCB hotspots. Hotspot areas as defined in this ROD are then subject to sediment remediation as described below. At this Site, EPA has defined PCB hotspots to be areas with concentrations above 1 ppm in St. Lawrence River and Raquette River sediments and associated soils and above 0.1 ppm in Turtle Creek and Raquette River sediments within the boundaries of the Reservation.

The 1 ppm PCB cleanup in the St. Lawrence and Raquette Rivers was based on interim federal and State sediment quality criteria guidance as well as on EPA's risk assessment. Application of interim federal sediment quality criteria guidance indicates that a PCB cleanup level in sediments should be between 0.08 and 2 ppm. State sediment quality criteria guidance indicates that PCB cleanup levels well below 1 ppm are required to achieve protection of the environment. EPA's risk assessment for the Site demonstrates that a 1 ppm PCB cleanup level in sediment corresponds to a 4×10^{-5} excess cancer risk.

Therefore, in an attempt to minimize residual risks, EPA has selected 1 ppm as a cleanup goal in the St. Lawrence and Raquette Rivers. In selecting the 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers, EPA has also balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers is achievable and provides an acceptable measure of protection to human health.

The 0.1 ppm hotspot definition for Turtle Creek selected by EPA is based on Tribal regulations and applies to the entire area of Turtle Creek, including the adjacent cove (see Figure 3). While EPA acknowledges the applicability of the Tribal regulations in Turtle Creek, technical limitations of dredging, which is the only means of removing sediment, may prevent compliance with this requirement.

EPA estimates that there are 62,000 cubic yards of sediments and soils in the river system with PCB concentrations above 1 ppm in the St. Lawrence and Raquette Rivers and in Turtle Creek. There

are additional soils and sediments in and around Turtle Creek which are contaminated with PCBs at levels below 1 ppm. These soils are not included in the estimated volume of sediments and soils given above.

River system sediments which are treated must have PCB concentrations less than or equal to 10 ppm prior to disposal. This treatment level is based on the cleanup and treatment levels selected by EPA for soil/sludge on the G.M. facility, as described above. This is appropriate because contaminated sediments would be deposited on the G.M. facility after treatment. Because the cleanup levels and treatment levels for sediments are not identical, Reservation sediments with PCB concentrations above 0.1 ppm and below 10 ppm and other sediments with PCB concentrations above 1 ppm and below 10 ppm would not require treatment to remove contaminants prior to disposal on the G.M. facility.

Contaminated River and Tributary Sediments

The remedial alternatives evaluated for the river system include: no action, in-place containment of river sediments, and dredging of sediments with on-site treatment (using one of the six PCB treatment technologies outlined above).

No Action for the River Sediments

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) requires that the "no action" alternative be considered at Superfund sites. This alternative consists of allowing the contaminated river sediments, riverbanks, and associated wetlands to remain in their present state in the river system.

No actions would be taken to remove or contain contaminated sediments or soil which currently pose a threat to human health and the environment in these areas. There are no costs or implementation times associated with the no action alternative for river sediments.

In-Place Containment of River Sediments

This alternative (also called in-situ containment) consists of the placement of a graded aggregate cover over the contaminated river sediments (see Figure 4). This alternative is designed to limit the transport of river sediments and is based on methods used to reduce shoreline erosion.

In this alternative, a silt curtain would be installed around the hotspots to minimize downstream transport of sediments disturbed during placement of the cover. The hotspots of PCB contamination in the river system would then be backfilled with a graded

filter. The thickness of the layers and the type of aggregate to be used in the cover would be determined during design of the cover and would depend on river bottom slope, flow, and current velocity.

Following completion of backfilling activities, the silt curtain would be removed and any accumulated sediment would be moved to the shore for on-site or off-site disposal. The ultimate method of disposal of the accumulated sediment, would be determined following completion of the containment system and would depend on the PCB concentration and water content of the sediments. Annual inspections to determine the cover's effectiveness in containing PCBs and preventing the movement of these hazardous substances into the water column would be performed. Long-term maintenance of the cover, including repair and replacement, would be performed as required.

EPA estimates that the total present worth cost of this alternative is $ 3.6 million. This alternative would require approximately 6 months to construct following completion of design. Because containment of contaminated sediments would be used to mitigate one of the principal threats from this Site, sediment containment would be performed at the earliest opportunity.

Sediment Dredging and On-Site Treatment

This alternative consists of dredging approximately 62,000 cubic yards of PCB contaminated hotspots in the river system and wetlands and on the riverbanks with subsequent on-site treatment with one or a combination of the six treatment methods described earlier. Prior to remediation, a silt curtain or other sediment control device would be installed to control sediment that might be suspended during dredging activities. In addition, a sheet pile wall would be installed on the river side of the dredging area to provide a stilling basin for dredging operations. Prior to remediation of the Raquette River sediments and riverbank soils, the sludges contained in the storm sewer line leading to the existing G.M. outfall to the Raquette River would be removed and the outfall would be monitored and secured to ensure that it could not serve as a source of future contamination to the River.

During design, a decision would be made on the most appropriate type of dredging method to minimize sediment resuspension. During dredging, contaminated sediments within the previously defined PCB hotspots in the river system would be removed. Sediments which are suspended during dredging and which are deposited downstream may be redredged, if necessary. From an engineering perspective, removal of virtually all sediments in fairly shallow areas will be the simplest way to ensure compliance with EPA's cleanup goals and will provide an extra

measure of protection in areas where even low levels of PCBs in sediments pose a risk to wildlife.

If necessary for treatment, a temporary sediment dewatering basin and a sediment storage area would be constructed on the shore in the vicinity of sediment remediation. Leachate and decant water from these areas would then be pumped to a wastewater treatment plant and subsequently discharged to the river in compliance with SPDES requirements.

After dredging, the material would be treated on-site using one or a combination of the six treatment methods described above. Treatment residuals would be required to have PCB concentrations below the G.M. facility soil cleanup level of 10 ppm PCBs. Bulk river debris which could not be treated would be disposed in a facility which meets all TSCA requirements, as necessary. The treated sediments would be dewatered and disposed in areas located on G.M. property and covered with a vegetated soil cap which complies with New York State and TSCA chemical waste landfill requirements, provided they were non-hazardous, adequately dewatered, and met EPA's treatment goals for the Site. The silt curtain and sheet pile wall would be removed and decontaminated or disposed after completion of the dredging operation. Dredged areas would be covered and restored to their original grade with clean fill and the riverbed, riverbanks, and wetlands restored as closely as possible to their pre-dredging condition.

Major applicable or relevant and appropriate requirements (ARARs) for this alternative are relevant and appropriate RCRA treatment regulations, applicable TSCA disposal requirements, Tribal PCB requirements (see Table 7) which are applicable on the Reservation, relevant and appropriate RCRA closure requirements, applicable New York State solid waste disposal requirements, relevant and appropriate New York State hazardous waste disposal requirements, and applicable SPDES requirements.

The costs of this alternative depend on the type of treatment used and are presented in Table 8. As shown, present worth costs range from $ 7.7 million to $ 32 million. Implementation times for this alternative range from a few months (for solidification) to two years (for chemical extraction or thermal destruction). These times do not include time required to construct treatment units. Design and construction of treatment units, including performance of required treatability studies, could be performed in approximately two years. Because removal of contaminated sediments would be used to mitigate one of the principal threats from this Site, sediment dredging would be performed at the earliest opportunity. Sediment storage would be used, as necessary, to expedite sediment dredging while treatability tests were conducted and treatment facilities were built.

North Disposal Area, Contaminated Soil on the St. Regis Mohawk Reservation, Contaminated Soil on G.M. Property

The following alternatives were evaluated for the contaminated material in these areas: no action, capping, solids excavation and on-site treatment (using one of the methods outlined above), and excavation of the material with on-site disposal.

No Action for the North Disposal Area, Reservation Soil and Soil on G.M. Property

This alternative consists of allowing the 100,000 cubic yards of contaminated soils, sludges and solids in these areas to remain in their present state. No actions would be taken to remove or contain contaminated materials which currently pose a potential threat to human health and the environment in these areas. There are no costs or implementation times associated with the no action alternative for these areas.

Capping of the North Disposal Area, Reservation Soil, and Soil on G.M. Property

This alternative includes containing wastes in the North Disposal Area on-site to minimize infiltration. As part of this alternative, shallow soil on the St. Regis Mohawk Reservation and soils from areas on G.M. property not associated with past disposal practices would be excavated and consolidated on G.M. property, possibly in the North Disposal Area.

The North Disposal Area (including the buried interceptor lagoon) and other soils would then be graded to enhance surface drainage. Surface water would be rerouted and discharged to the river system, in accordance with SPDES requirements.

Two specific capping methods were considered by EPA: a soil cover and a synthetic composite cover. In the soil cover method, after grading, the North Disposal Area and other soils would be compacted and covered with one layer of a synthetic material known as geotextile, two feet of clay and six inches of topsoil. Revegetation of the cover, regular cover inspection and maintenance, and groundwater monitoring would complete the remediation. Dust suppression measures would be implemented during cover construction.

The composite cover alternative also includes compaction of the North Disposal Area and other soils. The North Disposal Area and other soils would then be capped using the following materials: three feet of clay, one layer of flexible membrane liner, one layer of drainage material, one layer of geotextile, eighteen inches of rooting zone soil and six inches of topsoil. Revegetation of the covers, regular cover inspection and maintenance, and groundwater monitoring would complete the

remediation. Dust suppression measures would be implemented during cover construction. Excavated areas on the Reservation would be restored to their original condition with clean fill and revegetated. Excavated areas on G.M. property would be covered to reduce erosion and prevent migration.

Major ARARs for this alternative are applicable TSCA disposal requirements, Tribal PCB requirements which are applicable on the Reservation, applicable New York State solid waste disposal requirements, and relevant and appropriate RCRA and New York State hazardous waste disposal and closure requirements. The present worth costs of this alternative are $ 4.2 million for a soil cover and $ 4.8 million for a composite cover. This alternative would require approximately two years to complete.

Excavation and On-Site Treatment of Solids in the North Disposal Area, Reservation Soil, and Soil on G.M. Property

This alternative consists of excavating 51,000 cubic yards of contaminated soil, debris and sludge in the North Disposal Area (including the buried interceptor lagoon) with concentrations above 10 ppm PCBs, 15,000 cubic yards of contaminated soil on the Reservation with concentrations above 1 ppm PCBs, and approximately 34,000 cubic yards of soil on the G.M. property with PCB concentrations above 10 ppm and treating them with one or a combination of the six treatment methods discussed above. Following excavation, material from the Reservation would be temporarily stockpiled near the location of the on-site treatment facility.

Solids would be preprocessed to reduce particle size. Large contaminated objects which could not be treated would be disposed in a facility which meets all TSCA requirements, as necessary. Non-hazardous treated material with concentrations less than EPA's cleanup levels (see Table 6) would be disposed in areas on G.M. property and covered with a vegetated soil cap which complies with New York State and TSCA chemical waste landfill requirements. Treatment residuals would be required to have PCB concentrations below the G.M. facility soil cleanup level of 10 ppm PCBs. The excavated areas on the Reservation would be restored with clean fill to their original grade. Excavated areas on G.M. property would be covered to reduce erosion and prevent migration. These areas would be graded to prevent any surface water runoff from G.M. property and restored to support vegetation. A long-term groundwater monitoring program would also be implemented.

Major ARARs associated with this alternative are applicable TSCA disposal requirements, relevant and appropriate RCRA treatment regulations, Tribal PCB requirements which are applicable on the Reservation, applicable New York State solid waste disposal requirements, relevant and appropriate RCRA and New York State

hazardous waste disposal and closure requirements, and CAA and New York State air quality standards. The costs of this alternative are given in Table 9. Present worth costs range from $ 25 million to $ 56 million. Implementation times for this alternative range from a few months (for solidification) to four years (for chemical extraction or thermal destruction). These times do not include time required to design or construct any required treatment units.

Excavation and On-Site Disposal of Solids in the North Disposal Area, Reservation Soil, and Soil on the G.M. Property

This alternative consists of excavation of 100,000 cubic yards of contaminated soils, debris and sludges in the North Disposal Area (including the buried interceptor lagoon), on the Reservation, and on G.M. property followed by placement of these materials in an on-site double-lined landfill located on G.M. property.

A landfill would be constructed on the Site in compliance with federal and state regulations governing landfill construction. The landfill would be bermed and would be designed so that the base of the landfill was above the groundwater table. Contaminated material would then be excavated and transported to the on-site landfill for disposal. Following disposal, the landfill would be covered and closed according to federal and state regulations.

The excavated areas on the Reservation would be restored with clean fill to their original grade and revegetated. Excavated areas on G.M. property would be covered to reduce erosion and prevent migration. Maintenance of the landfill would include upkeep of the landfill cover and an access road, leachate treatment, and semi-annual groundwater monitoring. Treated leachate and groundwater would be discharged to the St. Lawrence River in compliance with SPDES requirements.

Major ARARs for this alternative are RCRA closure requirements which are relevant and appropriate for the wastes at the Site, applicable New York State solid waste disposal requirements, relevant and appropriate New York State hazardous waste disposal and closure requirements, Tribal PCB requirements which are applicable on the Reservation, and TSCA disposal requirements which are applicable at this Site. The present worth cost of this alternative is $ 24 million. Implementation time is approximately three years.

Industrial Lagoons

The following alternatives were evaluated for the sludges contained in the four lagoons (350,000 gallon, 500,000 gallon, 1.5 million gallon and 10 million gallon): no action, solids and sludge excavation and on-site treatment (using one of the

treatment alternatives outlined above) and solids and sludge excavation with disposal in an on-site disposal area.

No Action for the Lagoons

Under this alternative, the 91,000 cubic yards of sludge and underlying soil in the four Industrial Lagoons would not be remediated. The 500,000 gallon and 10 million gallon lagoons would continue to function as part of G.M.'s wastewater treatment system. The 1,500,000 gallon and 350,000 gallon lagoons would remain inactive and would not receive additional waste materials.

Lagoon Solids Excavation and On-Site Treatment

This alternative consists of excavating 91,000 cubic yards of contaminated sludges and underlying soils to a level of 10 ppm PCBs in the Industrial Lagoons and treating them with one or a combination of the six treatment methods discussed above. Prior to excavation, water in the lagoons would be removed, treated and discharged to the St. Lawrence River in compliance with SPDES requirements. During excavation, all sludges would be removed. Sludges would be delineated during remedial action either visually or through the use of physical tests, such as the EPA Paint Filter Test. Underlying soil contaminated above 10 ppm PCBs would also be removed. Following excavation, material might be temporarily stockpiled near the location of the on-site treatment facility. Solids would be preprocessed to reduce particle size. Treated material with concentrations less than EPA's cleanup levels (see Table 6) would be disposed in areas on G.M. property and covered with a vegetated soil cap which complies with New York State and TSCA chemical waste landfill requirements for a cover. Treatment residuals would be required to have PCB concentrations below the Site soil cleanup level of 10 ppm PCBs. In compliance with TSCA and as explained in subsequent sections of this ROD, sludge with initial concentrations above 500 ppm would be required to have PCB concentrations below 2 ppm after treatment. The excavated sides and bottoms of the lagoons would be covered to reduce erosion and prevent migration. A long-term groundwater monitoring program would also be implemented.

Major ARARs for this alternative are RCRA treatment requirements which are relevant and appropriate for the wastes at the Site, applicable New York State solid waste disposal requirements, relevant and appropriate RCRA and New York State hazardous waste disposal and closure requirements, and TSCA disposal requirements which are applicable at this Site. The present worth costs of this alternative range from $ 24 million to $ 48 million and are shown in Table 10. Implementation times for this alternative range from a few months (for solidification) to four years (for chemical extraction or thermal destruction). These times do not

include time required to design and construct any required treatment units.

Lagoon Solids Excavation with On-Site Disposal

This alternative consists of excavation of contaminated sludges and underlying soils in the Industrial Lagoons followed by placement of these materials in an on-site double-lined landfill located on G.M. property.

A landfill would be constructed on the Site as described previously for the on-site disposal of North Disposal Area soils. Water in the lagoons would be removed, treated and discharged to the St. Lawrence River in compliance with SPDES requirements. Contaminated sludge and soil would then be excavated and transported to the on-site landfill for disposal. Following disposal, the landfill would be covered and closed according to federal and state regulations. The sides and bottoms of the lagoon areas would be covered to reduce erosion and prevent migration.

Maintenance of the landfill would include upkeep of the landfill cover and an access road, leachate treatment, and semi-annual groundwater monitoring. Treated leachate and groundwater would be discharged to the St. Lawrence River in compliance with SPDES requirements.

Major ARARs for this alternative are applicable New York State solid waste disposal requirements, relevant and appropriate RCRA and New York State hazardous waste disposal and closure requirements, and TSCA disposal requirements which are applicable at this Site. The present worth cost of this alternative is $ 1. million. Implementation time is approximately four years.

Groundwater

Groundwater may be remediated by one of the following remedial alternatives: no action, containment of the groundwater and extraction and treatment of contaminated groundwater.

No Action for Groundwater

Under the no action alternative for groundwater, no groundwater remediation would occur. However, groundwater monitoring would be performed for a 30-year period.

The present worth of the groundwater monitoring costs associated with the no action alternative is $ 1.2 million. This alternative could be implemented immediately.

Groundwater Containment

This alternative provides for installation of a slurry wall downgradient of the Site to a depth sufficient to achieve a hydraulic barrier. The slurry wall would be keyed into the lowermost till deposit at the Site. In this way, the hydraulic pathway provided by the higher permeability sand layer would be eliminated. Pumping wells would also be installed on the G.M. side of the slurry wall as a hydraulic control measure. The water from the pumping wells would be treated in a wastewater treatment system which could include a combination of aeration, clarification, filtration, air stripping and carbon adsorption to remove VOCs and PCBs from the groundwater. After treatment, the water would be discharged to the St. Lawrence River in compliance with SPDES requirements.

Monitoring wells and piezometers would be placed inside and outside of the slurry wall's perimeter to detect possible infiltration and assure the integrity of the slurry wall.

The major ARARs associated with this alternative are RCRA and New York State groundwater monitoring requirements. The present worth cost associated with this alternative is $ 7.6 million. Implementation time for this alternative is two years.

Groundwater Recovery and Treatment

This alternative consists of the installation of recovery wells or trenches hydraulically downgradient of the Site for the removal and treatment of groundwater. Pumping wells or trenches could be located along the downgradient sides of the Industrial Landfill, the Industrial Lagoons, and the East Disposal Area. Extracted groundwater would be pumped to a wastewater treatment plant for treatment which could include a combination of aeration, clarification, filtration, air stripping and carbon adsorption to remove VOCs and PCBs from the groundwater. After treatment, the water would be discharged to the St. Lawrence River in compliance with SPDES requirements. Treated groundwater would be required to have PCB concentrations consistent with the SPDES requirements. Groundwater treatment residuals (e.g., spent carbon) would be tested and disposed as hazardous waste, if necessary.

The major ARARs associated with this alternative are relevant and appropriate Safe Drinking Water Act Maximum Contaminant Levels (MCLs), New York State groundwater quality standards, Tribal PCB requirements, RCRA treatment and land disposal requirements which are applicable if the groundwater treatment residuals are RCRA hazardous wastes, and federal and State groundwater monitoring regulations. The present worth cost associated with this alternative is $ 4 million. Implementation time for this alternative is two years.

SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

In accordance with the National Contingency Plan (NCP), a detailed analysis of each alternative was performed. The purpose of the detailed analysis was to objectively assess the alternatives with respect to nine evaluation criteria that encompass statutory requirements and include other gauges of the overall feasibility and acceptability of remedial alternatives. The analysis was comprised of an individual assessment of the alternatives against each criterion and a comparative analysis designed to determine the relative performance of the alternatives and identify major trade-offs, that is, relative advantages and disadvantages, among them.

The nine evaluation criteria against which the alternatives were evaluated are as follows:

Threshold Criteria - The first two criteria must be satisfied in order for an alternative to be eligible for selection.

1. **Overall Protection of Human Health and the Environment** addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with Applicable, or Relevant and Appropriate Requirements (ARARs)** is used to determine whether each alternative will meet all of its federal and state ARARs. When an ARAR is not met, the detailed analysis should discuss whether one of the six statutory waivers is appropriate.

Primary Balancing Criteria - The next five "primary balancing criteria" are to be used to weigh major trade-offs among the different hazardous waste management strategies.

3. **Long-term Effectiveness and Permanence** focuses on any residual risk remaining at the Site after the completion of the remedial action. This analysis includes consideration of the degree of threat posed by the hazardous substances remaining at the Site and the adequacy of any controls (for example, engineering and institutional) used to manage the hazardous substances remaining at the Site.

4. **Reduction of Toxicity, Mobility, or Volume Through Treatment** is the anticipated performance of the treatment technologies a particular remedy may employ.

5. **Short-term Effectiveness** addresses the effects of the alternative during the construction and implementation phase until the remedial response objectives are met.

6. **Implementability** addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation.

7. **Cost** includes estimated capital, and operation and maintenance costs, both translated to a present-worth basis. The detailed analysis evaluates and compares the cost of the respective alternatives, but draws no conclusions as to the cost-effectiveness of the alternatives. Cost-effectiveness is determined in the remedy selection phase, when cost is considered along with the other balancing criteria.

Modifying Criteria - The final two criteria are regarded as "modifying criteria," and are to be taken into account after the above criteria have been evaluated. They are generally to be focused upon after public comment is received.

8. **State and Tribe** Acceptance reflects the statutory requirement to provide for substantial and meaningful State and Tribal involvement.

9. **Community Acceptance** refers to the community's comments on the remedial alternatives under consideration, along with the Proposed Plan. Comments received during the public comment period, and the EPA's responses to those comments, are summarized in the Responsiveness Summary which is attached to this ROD.

The following is a summary of the comparison of each alternative's strengths and weaknesses with respect to the nine evaluation criteria.

Overall Protection of Human Health and the Environment

With the exception of the no action alternatives, each of the alternatives for the various contaminated areas, if properly implemented, operated, and maintained, protects human health and the environment. Although the alternatives differ in the degree of protection they afford, all provide human health risks within the acceptable EPA range of 10^{-4} to 10^{-6}.

The current risks to the adult Mohawk population associated with the no action alternatives for river sediments and Reservation soil are not within the EPA risk range. EPA estimates that the current risks to the adult Mohawk population associated with the no action alternatives for the North Disposal Area and for the

Industrial Lagoons are within the EPA risk range. However, based on information supplied by G.M. and on its experience at other sites, EPA believes that the current risks to G.M. workers from these areas is unacceptable. Since the no action alternatives are not protective, they will not be considered in the remainder of this analysis.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

All alternatives comply with ARARs or provide the grounds for invoking an ARAR waiver as noted below.

Sediment Dredging and On-Site Treatment

During dredging, EPA's goal is removal of all contaminated sediments within PCB hotspots. Within Turtle Creek, this goal is in compliance with the Tribal PCB ARAR of 0.1 ppm PCBs. Based on limited previous experience at other Superfund sites and federal projects, it is possible that dredging to 0.1 ppm PCBs will be technically impracticable. Therefore, this alternative requires that EPA waive the Tribal sediment standard due to technical impracticability, as discussed in CERCLA, section 121(d)(4)(C). EPA would consult with the St. Regis Mohawk Tribe and NYSDEC before making a final determination as to the technical impracticability of meeting the Tribal sediment PCB ARAR.

Excavation and On-Site Treatment of Solids in the North Disposal Area, Reservation Soil, and Soil on G.M. Property and Lagoons Solids Excavation and On-Site Treatment

According to TSCA disposal regulations and policy, all treatment residuals with PCB concentrations above 2 ppm must be disposed in a TSCA chemical waste landfill. However, these alternatives specify that treatment residuals with PCB concentrations less than 10 ppm will be disposed on G.M. property in a disposal facility which will include, at a minimum, a vegetated soil cap. Therefore, depending on the type of disposal facility ultimately selected during design, these alternatives require that, in accordance with TSCA regulations (40 CFR 761.75(c)(4)), EPA waive certain TSCA chemical waste landfill requirements for treatment residuals with PCB concentrations above 2 ppm. These TSCA chemical landfill requirements would be waived because treatment residuals which meet Site cleanup standards do not present an unreasonable risk of injury to health or the environment from PCBs. EPA bases this finding on its risk assessment and the EPA August 1990 PCB guidance which indicate that 10 ppm is protective of human health at the Site.

In addition, TSCA regulations require that sludges with PCB concentrations above 500 ppm be incinerated in a TSCA compliant incinerator or be treated by a method equivalent to incineration.

In compliance with TSCA, any sludges with initial PCB concentrations above 500 ppm which cannot be treated by an innovative technology to achieve PCB residuals below 2 ppm must be incinerated.

Groundwater Recovery and Treatment

During recovery and treatment, EPA's cleanup goal is the New York State PCB ARAR of 0.1 ppb PCBs. Based on EPA studies of other sites, EPA has found that the final groundwater cleanup level will depend on technical considerations such as the propensity of PCBs to sorb to soil.

Long-Term Effectiveness and Permanence

In general, remedies which include excavation and treatment perform best with respect to long-term effectiveness and permanence. Containment and capping remedies provide a lower degree of permanence in remediating contamination at the Site. Although sediment containment with a graded cover would reduce the erosive force of the flowing river water and would limit movement of contaminants into the environment, its long-term effectiveness is dependent upon the adequacy and reliability of the sediment cover. Long-term monitoring and maintenance of contained sediments which would be required would be difficult to achieve because the cover is located underwater. Little information is available on the frequency of maintenance or on the probability of cover failure. If the sediment cover fails, risks on the order of 10^{-2} would be present immediately. Sediment dredging permanently removes the risks from contaminated sediments.

Similarly, capping of solids in the North Disposal Area and other areas is less permanent than solids excavation. Long-term monitoring and maintenance of covered areas would be required and these areas would not be usable once capped. On-site disposal without treatment would not implement any permanent treatment technologies and is less effective in the long-term than treatment and disposal.

With respect to the treatment alternatives, thermal destruction is a permanent and effective technology since it results in destruction of PCBs. Of all the technologies considered, it is likely that incineration will meet required treatment levels.

Chemical extraction, biological treatment, chemical destruction and thermal extraction technologies have the potential to permanently remediate the Site; however, uncertainties exist because these technologies have not been proven in the past. Treatability studies would be necessary during the design phase to ensure long-term effectiveness of these alternatives. Solidification is less permanent than other treatment

technologies considered and solidified material would require long-term management.

The long-term effectiveness of groundwater containment depends on the stability of the slurry wall. The long-term effectiveness of groundwater recovery and treatment depends on the reliability of the recovery system. Both groundwater containment or recovery and treatment would reduce the risk from direct exposure to contaminated groundwater.

Reduction of Toxicity, Mobility or Volume

Biological treatment, chemical destruction, and thermal destruction perform best with respect to this measure. Containment alternatives do not employ treatment although they do reduce contaminant mobility. Treatment alternatives address principal threats through treatment of contaminated materials. Biological treatment, chemical destruction, and thermal destruction reduce the toxicity, mobility and volume of toxic contaminants. Chemical and thermal extraction reduce the volume of toxic contaminants. Solidification reduces the mobility of toxic contaminants.

Groundwater alternatives would reduce the mobility of the contaminated groundwater; groundwater treatment would also reduce the toxicity and volume of the contaminants in the treated groundwater.

Short-Term Effectiveness

Containment alternatives which can be implemented quickly with moderate amounts of dust generation perform best with respect to short-term effectiveness. Any alternatives which incorporate Site excavation would be accompanied by an increase in dust generation during excavation. Although mitigative measures would be used, the emission of contaminated dust during excavation is much greater than during containment activities where the contaminated soils would remain relatively undisturbed.

Implementation of sediment dredging would result in resuspension of sediments. Minimization of sediment resuspension would be accomplished through the use of engineering controls such as sheet piles, silt curtains, and coffer dams and through selection of appropriate dredging equipment and production rates. These controls have been proven to control sediment resuspension.

Biological treatment, thermal destruction, chemical destruction, thermal extraction, and solidification result in air emissions which will have a short-term effect on the community and Site workers. The short-term excess cancer risks to the adult Mohawk population and remediation workers during implementation of the remedial alternatives are presented in Table 11. Risks to

remediation workers can be mitigated through the use of protective equipment. Risks to G.M. workers would be lower than those for remediation workers.

The area on the St. Regis Reservation will be impacted by excavation of the North Disposal Area and emissions from treatment equipment; precautions to minimize potential impacts will be included in the design phase for the remediation of the Site. If necessary, these precautions may include temporary relocation of Raquette Point residents. Any impacted wetlands or habitats will be restored after excavation, if necessary. Residual impacts to the wetlands may remain after excavation. Groundwater alternatives do not pose significant short-term risks to the community or workers.

Sediment dredging would require approximately one year to complete. Completion of pilot treatability studies (if necessary), remedial design and construction for all alternatives will take up to two years. The time to complete a biological treatment process for all areas addressed in this operable unit is estimated to be three years from completion of construction of the treatment units. Chemical destruction of all of the contaminated material addressed in this ROD would take approximately four years from construction completion, assuming a treatment rate of 175 cubic yards per day.

Utilizing three treatment units after construction completion, the chemical extraction alternative would require five years for treatment of all areas addressed in this ROD assuming each unit processed 49 cubic yards per day. Using the thermal destruction alternative for all of the contaminated material addressed in this ROD, the remedial action would take seven years to complete following construction, assuming a processing rate of 4.2 cubic yards per hour. The thermal extraction alternative would require approximately four years for completion of the remedial action following construction, assuming a processing rate of seven cubic yards per hour. The solidification alternative, at a process rate of 200 tons per hour, would require approximately one-half year to complete following construction.

Implementability

All of the alternatives are implementable from an engineering standpoint. However, there are some inherent difficulties which may be encountered during implementation of some alternatives. Engineering controls will be employed to minimize sediment resuspension during the dredging process. Although adequate sediment dredging services are currently available, dredging will require coordination with the governments of the St. Regis Mohawk Tribe, New York State, and Canada.

The construction of a sediment cover system will involve some sediment resuspension. In the event that the sediment cover fails and dredging is required, the multi-layer sediment cover material would be an impediment. Monitoring of the sediment cover system will be severely hampered by ice cover during the winter months.

Solids excavation in the North Disposal Area, on the Reservation and on G.M. property is easily implementable. Treatment alternatives will require treatability studies to optimize the design and operating parameters for the treatment system. These treatability studies will determine the implementability of innovative technologies including biological treatment, chemical destruction, and chemical and thermal extraction. If innovative technologies are not found to be implementable, other more proven technologies, such as incineration, would be used to treat soils, sludges and sediments. Full-scale equipment and vendors are available for chemical destruction, chemical extraction, thermal destruction, and solidification.

Cost

The costs associated with the alternatives for each disposal area are presented in Tables 8 - 10. These costs are estimates and may change as a result of design and construction modifications.

Capital costs include fixed costs (costs associated with equipment mobilization and site preparation) and non-fixed costs (costs associated with treatment of a specific disposal area). Capital costs are only incurred once for each treatment technology. Thus, significant savings (in fixed costs) from those costs displayed in the Tables 8 -10 will result whenever the same treatment technology is used for two different disposal areas.

State and Tribe Acceptance

New York State has expressed a preference for permanent remedies which include excavation and treatment of most contaminated soils, sediments, and sludges from the Site. The St. Regis Mohawk Tribe has indicated that its primary concern is protection of the Mohawk people's health and environment through expeditious cleanup of the Site. To this end, they support the removal of contamination from the Reservation and comprehensive controls which ensure that there will be no further migration of contamination from the G.M. Site onto the Reservation, or into waters utilized by the Mohawk people. Consequently, the Tribe advocated inclusion of the East Disposal Area in this ROD. NYSDEC and the Tribe have concurred on this ROD (see Appendix 3).

Community Acceptance

Comments from the community submitted during the public comment period indicate that the community has varying opinions regarding remediation of the Site. Many citizens expressed a desire for complete removal and treatment of all contamination at the Site. Other citizens, many of them residents of Massena, supported a G.M. plan for Site remediation which included sediment containment, excavation of Reservation soil and soil in the North Disposal Area, excavation and treatment of the inactive lagoons, and groundwater recovery and treatment. Community comments are responded to in detail in the Responsiveness Summary which is an appendix to this document.

DESCRIPTION OF THE SELECTED REMEDY

The major components of the selected remedy for the first operable unit include:

- Dredging/excavation and on-site treatment of sediments and soils in PCB hotspots in the St. Lawrence and Raquette Rivers and in Turtle Creek, in associated wetlands, and on St. Lawrence and Raquette River banks

  Hotspots in the St. Lawrence and Raquette Rivers and Turtle Creek will be dredged and excavated to remove PCBs. All PCB contaminated sediments in the hotspots will be removed given the technological limitations associated with dredging. EPA anticipates that residual PCB levels in dredged hotspot areas will be no greater than 1 ppm in the St. Lawrence and Raquette Rivers. In selecting the 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers, EPA has balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers is achievable and provides an acceptable measure of protection to human health.
  EPA intends to comply with the Tribal PCB ARAR by removing sediments with PCB concentrations greater than 0.1 ppm PCBs in Turtle Creek. However, technical limitations may preclude removal of sediments to 0.1 ppm PCBs. If this is the case, EPA will remove all contaminated sediments to the extent practicable due to the limitations of dredging technology. Sediment resuspension will be minimized through the use of engineering controls. However, if, as a result of dredging, resuspended sediments settle on Tribal land, they will be subject to the Tribal sediment ARAR.

  Based on a 1 ppm PCB cleanup level, the PCB hotspot in the St. Lawrence River extends from approximately 1200 feet above the G.M. outfall to 700 feet below the mouth of Turtle

Creek and approximately 300 feet from the shore. The PCB hotspot in the Raquette River, based on a 1 ppm PCB cleanup level, extends to the soils on the riverbank and to the sediments in the river which are along the shore approximately 250 feet upriver and 250 feet downriver from the G.M. outfall. The approximate limits of the PCB hotspot in Turtle Creek extend from the cove at the mouth of Turtle Creek to a point 2500 feet upstream from the mouth of Turtle Creek.

Prior to remediation, a wetlands assessment, floodplains assessment, cultural resources survey, and a statement of consistency with the New York Coastal Management Program will be required. Excavated sediments will be dewatered, as necessary. Decanted water would be treated, as necessary by methods which could include a combination of aeration, clarification, filtration, air stripping and carbon adsorption to remove VOCs and PCBs and discharged to the St. Lawrence River. Bulk items which are not amenable to treatment will be separated from the sediments and disposed in a facility which meets all TSCA requirements, as necessary.

During remediation, additional sediment analyses may be required to better delineate PCB hotspots. In addition, silt curtains or other sediment control devices will be installed to control sediment that might be disturbed during dredging activities. Sheet pile walls will be installed on the river side of the dredging areas to provide a stilling basin for dredging operations. Prior to remediation of the Raquette River sediments, the sludges from the existing G.M. outfall to the Raquette River will be removed and the outfall will be plugged and secured to ensure that it will not serve as a source of future contamination to the River.

Sediments will be treated to levels below 10 ppm PCBs. The type of treatment to be used will be determined on the basis of treatability tests during design. If any sediments cannot be treated to levels below 10 ppm PCBs using biological treatment alone, incineration or one of the other innovative technologies tested during design which has been demonstrated to achieve site treatment goals will be used to treat them.

Treated sediments and sediments with initial PCB concentrations below 10 ppm will be disposed on G.M. property and covered with a vegetated soil cap which complies with New York State and TSCA chemical waste landfill requirements for a cover. The disposal area will be maintained. Dredged areas, riverbanks, and wetlands in the river system and on the St. Regis Mohawk Reservation will be restored, as closely as possible, to their original

grade and pre-dredging conditions. Post-remediation monitoring of the St. Lawrence River, Raquette River, and Turtle Creek and associated wetlands and riverbanks will be conducted to ensure that PCBs and other contaminants at unacceptable levels are no longer found in or migrating to these areas. Monitoring program plans will be finalized by EPA, in consultation with NYSDEC and the St. Regis Mohawk Tribe.

Because sediments present a principal threat at this Site, sediment excavation will proceed as soon as possible. If necessary to expedite sediment dredging, sediment will be stored in an upland protected area while treatability testing is conducted.

Interim surface runoff control in the East Disposal Area

The East Disposal Area will be contoured and revegetated as necessary to prevent surface runoff to the St. Regis Mohawk Reservation and to minimize movement of contaminated surface soil from the G.M. facility. Where possible, recontouring will be accomplished through the addition of fill so as not to disturb PCBs buried in the East Disposal Area. In addition, any contaminated surface water which is diverted from the East Disposal Area during and after recontouring will be treated to comply with SPDES requirements and discharged to the St. Lawrence River. A remedy for the East Disposal Area and Industrial Landfill will be the subject of a second operable unit ROD. Because contaminated surface soil in the East Disposal Area is a principal threat at this Site, runoff prevention will proceed as soon as possible.

Excavation and on-site treatment of PCB contaminated sludges and soils in the North Disposal Area, in the four Industrial Lagoons, and in other areas on G.M. property (active lagoons, while being addressed in this operable unit ROD, will be remediated when they are taken out of service)

Soil and sludge in the North Disposal Area (including the buried interceptor lagoon) and in miscellaneous areas on G.M. property with concentrations above the cleanup levels given in Table 6 will be excavated and treated to levels below 10 ppm PCBs. The type of treatment to be used will be determined on the basis of treatability tests during design. If any material cannot be treated to levels below 10 ppm PCBs using biological treatment alone, incineration or one of the other innovative technologies tested during design which has been demonstrated to achieve site treatment goals will be used to treat it. Bulk items which are not amenable to treatment will be separated and disposed in a facility which meets all TSCA requirements, as necessary. Treated

soils will be backfilled in areas on G.M. property and covered with a vegetated soil cap which complies with New York State and TSCA chemical waste landfill requirements for a cover. The disposal area will be maintained. The excavated areas in the North Disposal Area will be covered to reduce erosion and prevent migration.

Standing water in the inactive lagoons will be drained, treated as necessary to remove PCBs and discharged to the St. Lawrence River. All sludge in the lagoons will be excavated. Underlying soil with contaminant concentrations above the levels given in Table 6 will also be excavated and treated to levels below 10 ppm PCBs. The type of treatment to be used will be determined on the basis of treatability tests during design. If any lagoon material cannot be treated to levels below 10 ppm PCBs using biological treatment alone, incineration or one of the other innovative technologies tested during design which has been demonstrated to achieve site treatment goals will be used to treat it. Treated materials will be disposed in areas on G.M. property and covered with a vegetated soil cap which complies with New York State and TSCA chemical waste landfill requirements for a cover. The excavated areas in and around the lagoons will be covered to reduce erosion and prevent migration. The active lagoons will be remediated in exactly the same manner when they are taken out of service by G.M. In the interim, any contamination from the active lagoons which migrates to groundwater will be recovered as described below. For purposes of cost estimation, EPA has assumed that the active lagoons will be taken out of service in ten years.

Excavation and on-site treatment of PCB contaminated soil on St. Regis Mohawk Reservation land adjacent to the G.M. facility

Soil on the Reservation with PCB concentrations above 1 ppm PCBs will be excavated. Soil with PCB concentrations above 10 ppm will be treated to levels below 10 ppm. Bulk items which are not amenable to treatment will be separated and disposed in a facility which meets all TSCA requirements, as necessary. The type of treatment to be used will be determined on the basis of treatability tests during design. If any soil cannot be treated to levels below 10 ppm PCBs using biological treatment alone, incineration or one of the other innovative technologies tested during design which has been demonstrated to achieve site treatment goals will be used to treat it.

Treated soils and soils with initial PCB concentrations below 10 ppm will be disposed in areas on G.M. property and covered with a vegetated soil cap which complies with New

York State and TSCA chemical waste landfill requirements for a cover. The disposal area will be maintained. Excavated areas on the St. Regis Mohawk Reservation will be restored, as closely as possible, to their original grade and condition. Post-remediation monitoring on the Reservation will be conducted to ensure that PCBs are no longer migrating to areas from the G.M. facility. During remediation, necessary measures will be taken to protect Mohawk cultural resources. To protect the Tribe's spiritual values, a Mohawk cultural representative may need to be present during much of the remediation work on Mohawk lands.

Downgradient groundwater recovery and treatment with discharge of treated groundwater to the St. Lawrence River

Groundwater will be recovered downgradient of the Industrial Landfill, the Industrial Lagoons, and the East Disposal Area. Extracted groundwater will be pumped to a wastewater treatment plant for treatment which could include a combination of aeration, clarification, filtration, air stripping and carbon adsorption to remove VOCs and PCBs from the groundwater. After treatment, the water will be discharged to the St. Lawrence River. Groundwater will be treated to comply with SPDES requirements. Groundwater will be extracted and treated until groundwater PCB concentrations, as measured at the boundary of the Industrial Landfill, the Industrial Lagoons, and the East Disposal Area are below 0.1 ppb. During and after remediation, groundwater and surface water will be monitored. If necessary, additional groundwater and/or surface water recovery and treatment will be used to ensure that no contamination is migrating from the Site.

Testing of other PCB treatment technologies

Other innovative PCB treatment technologies will be tested concurrently with biological destruction so that EPA will have additional information in the event that biological destruction proves to be unsatisfactory for treatment of any Site material. Biological treatment will be used wherever EPA determines it to be viable. In the event that biological treatment is ineffective for a certain area of the Site or for certain Site materials, other innovative PCB treatment technologies (which have been demonstrated to achieve site treatment goals) or incineration may be employed. The criteria used to judge the treatment technologies during treatability testing include effectiveness and cost. EPA will select the treatment technologies to be employed, in consultation with NYSDEC and the St. Regis Mohawk Tribe.

The total present worth cost of the first operable unit selected remedy is $ 78 million. A breakdown of estimated costs associated with the selected remedy is presented in Table 12.

STATUTORY DETERMINATIONS

Protection of Human Health and the Environment

The selected remedy protects human health and the environment through the permanent treatment of contaminated sediments, soils, and sludges and through groundwater treatment. Treatment residuals will be covered. Bulk items which are not amenable to treatment will be separated and disposed in a facility which meets all TSCA requirements, as necessary. Following implementation of the selected remedy, the excess cancer risk to the adult Mohawk population will be on the order of 10^{-5} to 10^{-6}, depending on the residual sediment level attained after dredging.

Compliance with ARARs

A list of ARARs for the selected remedy is presented in Table 13. The selected remedy complies with these ARARs or provides the grounds for invoking a waiver as described below.

During dredging, EPA will attempt to meet the Tribal PCB ARAR of 0.1 ppm PCBs in Turtle Creek. However, based on limited previous experience at other Superfund sites and federal projects, dredging to 0.1 ppm PCBs may be technically impracticable. Therefore, EPA is waiving the Tribal sediment standard where it proves to be technically impracticable to achieve during dredging, as discussed in CERCLA, section 121(d)(4)(C). EPA will consult with the St. Regis Mohawk Tribe and NYSDEC before making a final determination as to the technical impracticability of meeting the tribal sediment PCB ARAR. EPA will base its determination on the results of dredging conducted in Turtle Creek.

According to TSCA disposal regulations and policy, soil treatment residuals with PCB concentrations above 2 ppm must be disposed in a TSCA chemical waste landfill. However, in accordance with TSCA regulations, EPA is waiving certain TSCA chemical waste landfill requirements for soil treatment residuals with PCB concentrations above 2 ppm and below 10 ppm. Specifically, provided the residuals are soils with a low water content and PCB concentrations below 10 ppm, EPA is waiving the TSCA requirements on landfill location and the TSCA requirement for a leachate collection system. These TSCA chemical landfill requirements are being waived under TSCA (40 CFR 761.75(c)(4)) because soil treatment residuals which meet Site cleanup standards do not present an unreasonable risk of injury to health or the environment from PCBs.

According to New York State hazardous waste disposal regulations at 6 NYCRR Part 370, all treatment residuals which satisfy the New York State definition of hazardous waste must be disposed in a landfill which meets New York State requirements. EPA does not anticipate that treatment residuals will be hazardous (e.g., have PCB concentrations above 10 ppm). However, all treatment residuals will be considered solid waste under New York State regulations at 6 NYCRR Part 360. New York State solid waste regulations, while mandating several requirements, including the use of a liner and leachate collection system, allow for less stringent requirements based on the potential pollution of the waste (6 NYCRR Part 360-2.14(a)).

During design, EPA, NYSDEC and the Tribe will finalize plans for the disposal of residuals. These plans will include certain provisions to ensure proper residuals disposal. For instance, the location of the residuals placement area will be selected such that the groundwater beneath the area flows towards the groundwater recovery and treatment system. Further, the residuals will be placed in a manner to ensure that they are not in contact with the shallow groundwater aquifer. The design of the cap will specify that soil with a very low permeability will be used. The cap will be constructed and maintained to prevent erosion and graded to direct runoff from the capped area. Should certain treatment residuals be hazardous or require greater protection than discussed above, EPA in consultation with New York State and the St. Regis Mohawk Tribe, will impose appropriate requirements in the finalized residuals treatment and disposal design plans.

In addition, TSCA regulations require that sludges with PCB concentrations above 500 ppm be incinerated in a TSCA compliant incinerator or be treated by a method equivalent to incineration. In compliance with TSCA, any sludges with initial PCB concentrations above 500 ppm which cannot be treated by an innovative technology to achieve PCB residuals below 2 ppm must be incinerated.

During groundwater recovery and treatment, EPA's cleanup goal is the New York State PCB ARAR of 0.1 ppb PCBs. Based on EPA studies of other sites, EPA has found that the final groundwater cleanup level will depend on technical considerations such as the propensity of PCBs to sorb to soil.

Cost-Effectiveness

The selected remedy is cost-effective because it has been demonstrated to provide overall effectiveness proportional to its costs. The present worth of the selected alternative is $ 78 million. EPA has selected an alternative which includes the use of biological treatment and incineration. This is a cost-

effective remedy since biological treatment was the least expensive of the treatment remedies evaluated for the Site.

Sediment dredging and treatment, although approximately seven times more expensive than containment, is cost-effective because it is a highly permanent and effective remedy for the principal threat at the Site and because it reduces contaminant toxicity. Similarly, the additional costs associated with lagoon sludge excavation and treatment and excavation and treatment of solids in the North Disposal Area, on the Reservation, and on G.M. property are proportional to the long-term effectiveness and reductions in toxicity afforded by these alternatives. The higher degree of effectiveness and the reduction in contaminant mobility associated with groundwater recovery and treatment justifies the additional costs associated with this alternative.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a cost-effective manner for the first operable unit at the G.M. Site. Of those alternatives that are protective of human health and the environment and meet ARARs, the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, and volume through treatment, short-term effectiveness, implementability, and cost while also considering the statutory preference for treatment as a principal element and considering State, Tribe and community acceptance.

The selected remedy offers a higher degree of permanence than containment alternatives. Because PCBs are highly persistent in the environment, removal and treatment provide the most effective way of assuring long-term protection. In addition, the use of biological treatment (or another innovative treatment technology), incineration, and groundwater treatment results in the reduction of toxicity and mobility of PCBs. Extraction technologies only reduce the volume of PCB contaminated materials. Although there are short-term impacts associated with the selected remedy, these can be mitigated and will not pose an unacceptable risk to the surrounding community, G.M. workers, or remediation workers.

Biological treatment presents some difficulties in implementation since it must be tested during design. However, incineration is a proven technology for the destruction of PCBs which can be used if necessary to ensure destruction of contaminated materials. Biological treatment is the least costly of all treatment alternatives evaluated. Therefore, use of biological treatment minimizes the cost of the selected alternative provided treatability tests show that it performs in a manner comparable

to the other technologies considered. In addition, EPA favors the development of biological treatment since it is an innovative technology.

The selection of treatment is consistent with Superfund program expectations that indicate that highly toxic, persistent wastes are a priority for treatment which ensures long-term effectiveness. Among the treatment alternatives considered for the various areas of the Site, the major tradeoffs that provided the basis for EPA's remedy selection were proven effectiveness of incineration and the cost of biological treatment.

Preference for Treatment as a Principal Element

By treating the contaminated sediments and solids in the river system, in the North Disposal Area, on the Reservation and on G.M. property and by treating contaminated groundwater, the selected remedy satisfies the statutory preference for remedies that employ treatment as a principal element for several of the principal threats posed by the Site.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the G.M. Site was released on March 21, 1990. The Proposed Plan identified the following preferred alternative:

- sediment dredging;
- excavation of lagoon sludges in all four Industrial Lagoons;
- excavation of solids and sludges in the North and East Disposal Areas, on the Reservation, and on G.M. property;
- groundwater recovery and treatment
- incineration of all excavated/dredged material with PCB concentrations greater than 500 ppm and biological treatment of all excavated/dredged material with PCB concentrations less than 500 ppm.

After reviewing all written and verbal comments received during the public comment period, EPA has made five significant changes from this proposed alternative. These changes were made based on new information received during the public comment period from EPA, the public, G.M., the St. Regis Mohawk Tribe and NYSDEC.

EPA has determined that its remedial decision for the East Disposal Area should be deferred. This determination was based on the fact that new EPA policy on Superfund sites with PCB contamination which may affect EPA's decision for the East

Disposal Area was released during the public comment period. EPA will select a remedy for the East Disposal Area and the Industrial Landfill in a second operable unit ROD.

EPA has determined that G.M. plant operations could be impacted during remediation of the active wastewater lagoons. This determination is based on comments received from G.M. which stated that the lagoons are an integral part of current plant operations. In addition, any groundwater releases from the active lagoons which would be a source of contamination to the environment will be dealt with through the groundwater recovery and treatment remedy specified in this ROD. As a result, EPA has delayed remediation of active lagoons. The method of remediation for the lagoons is exactly the same as for inactive lagoons, however, EPA will delay remediation of the active lagoons as long as they remain in service.

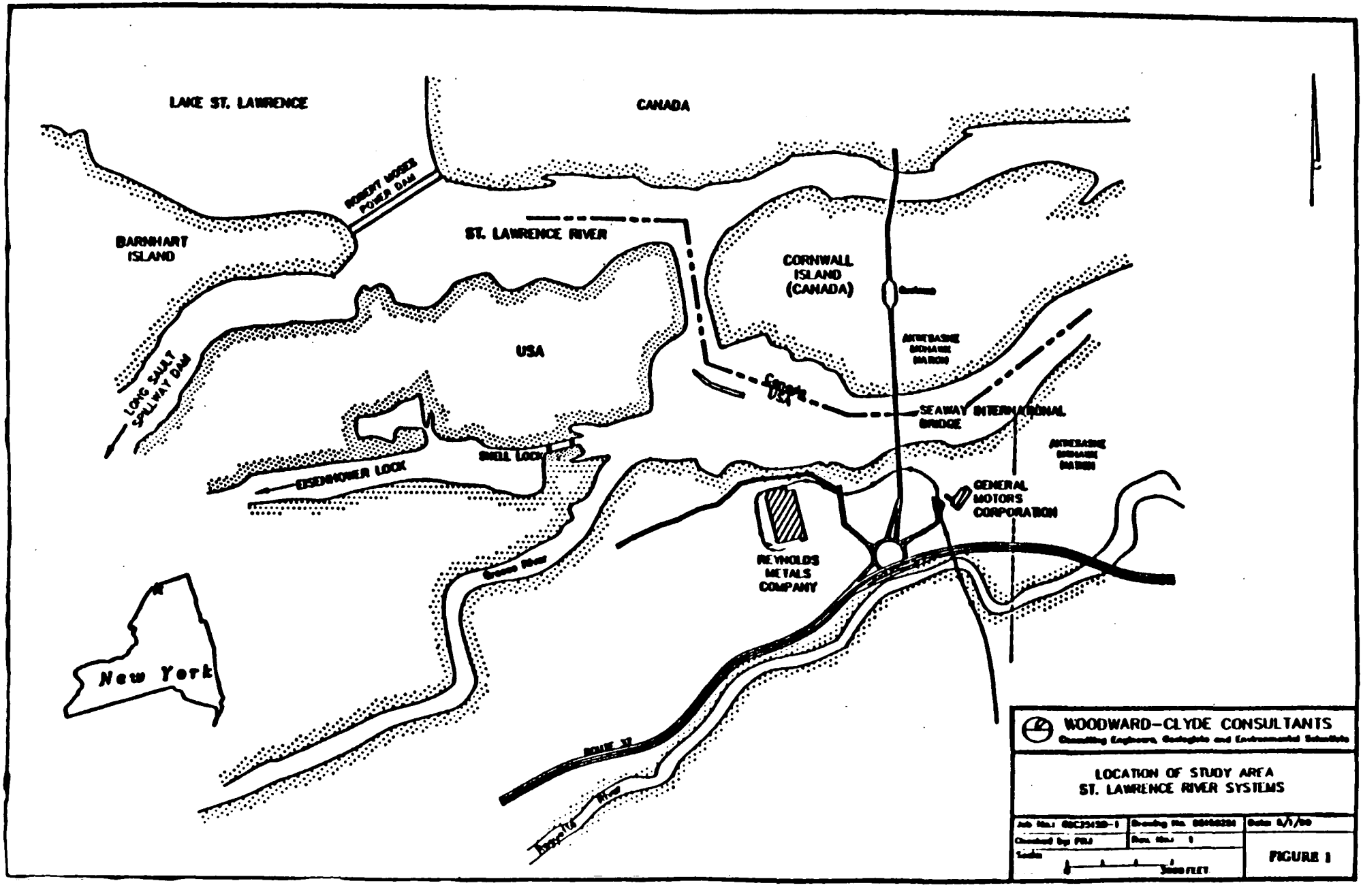
EPA has determined that the use of on-site incineration should be minimized in the selected remedy. This determination was based on comments from the public and the Tribe which stated that incineration was the least preferred treatment method for the Site. As a result, EPA will rely on the results of treatability tests to determine whether biological treatment will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies which will be tested concurrently with biological treatment may be employed. In the event that these other technologies are ineffective, incineration will be used at the Site.

EPA has determined that a lower PCB cleanup goal is warranted in St. Lawrence River sediments and soils. This determination was based on comments from the public, NYSDEC, the Tribe, and the Natural Resource Trustees which called for lower cleanup levels in the river system. Based on these comments and on a review of the data used to determine the initial sediment cleanup level, EPA has revised the PCB cleanup level in the St. Lawrence River to 1 ppm. The 1 ppm level roughly corresponds to a 10^{-5} excess cancer risk to adult Mohawks.

Finally, EPA has determined that a higher PCB cleanup goal is warranted in Raquette River sediments. This determination was based on a review of PCB data which shows that all contamination detected in the Raquette River is located on the riverbank and in the sediment near the former G.M. outfall. Since this area is not located on the Reservation, EPA has revised the PCB cleanup level in the Raquette River to 1 ppm.

APPENDIX 1

FIGURES


LAKE ST. LAWRENCE
CANADA
ROBERT MOSES POWER DAM
BARNHART ISLAND
ST. LAWRENCE RIVER
CORNWALL ISLAND (CANADA)
USA
LONG SAULT SPILLWAY DAM
SEAWAY INTERNATIONAL BRIDGE
EISENHOWER LOCK
SNELL LOCK
GENERAL MOTORS CORPORATION
REYNOLDS METALS COMPANY
New York
WOODWARD-CLYDE CONSULTANTS
LOCATION OF STUDY AREA
ST. LAWRENCE RIVER SYSTEMS
FIGURE 1

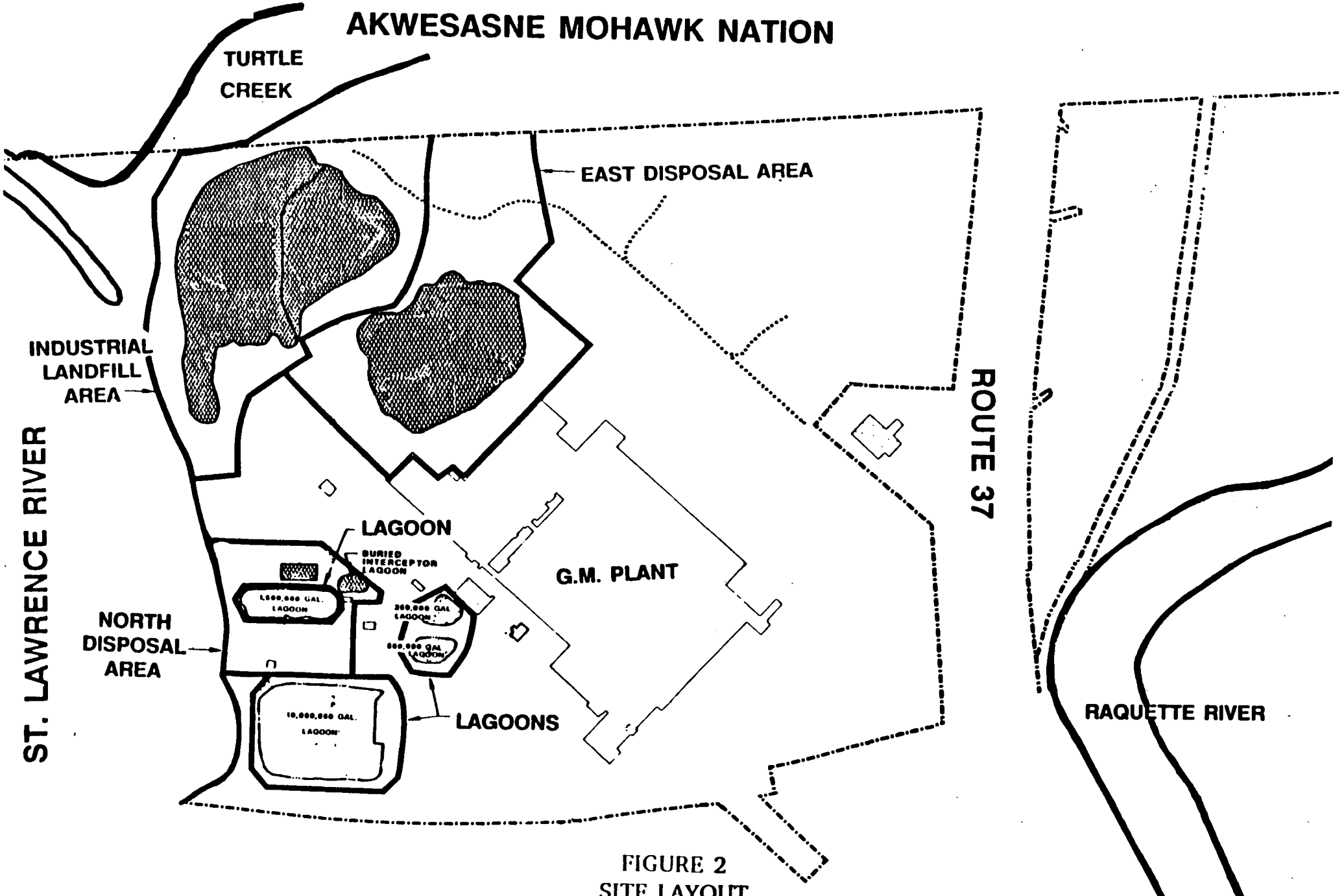


FIGURE 2
SITE LAYOUT

SOURCE: G.M. REMEDIAL INVESTIGATION, MAY 1986

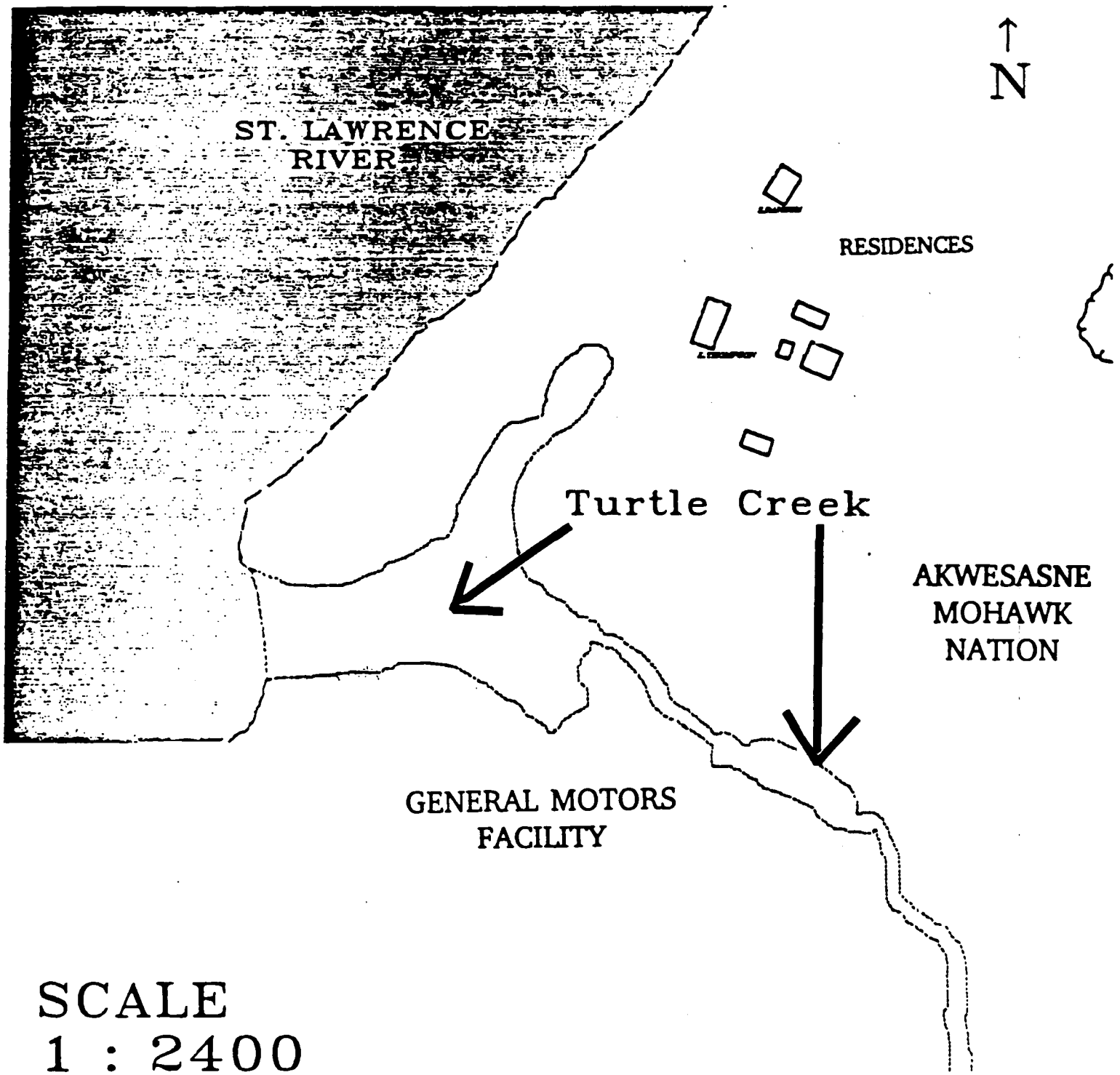


FIGURE 3
DELINEATION OF TURTLE CREEK

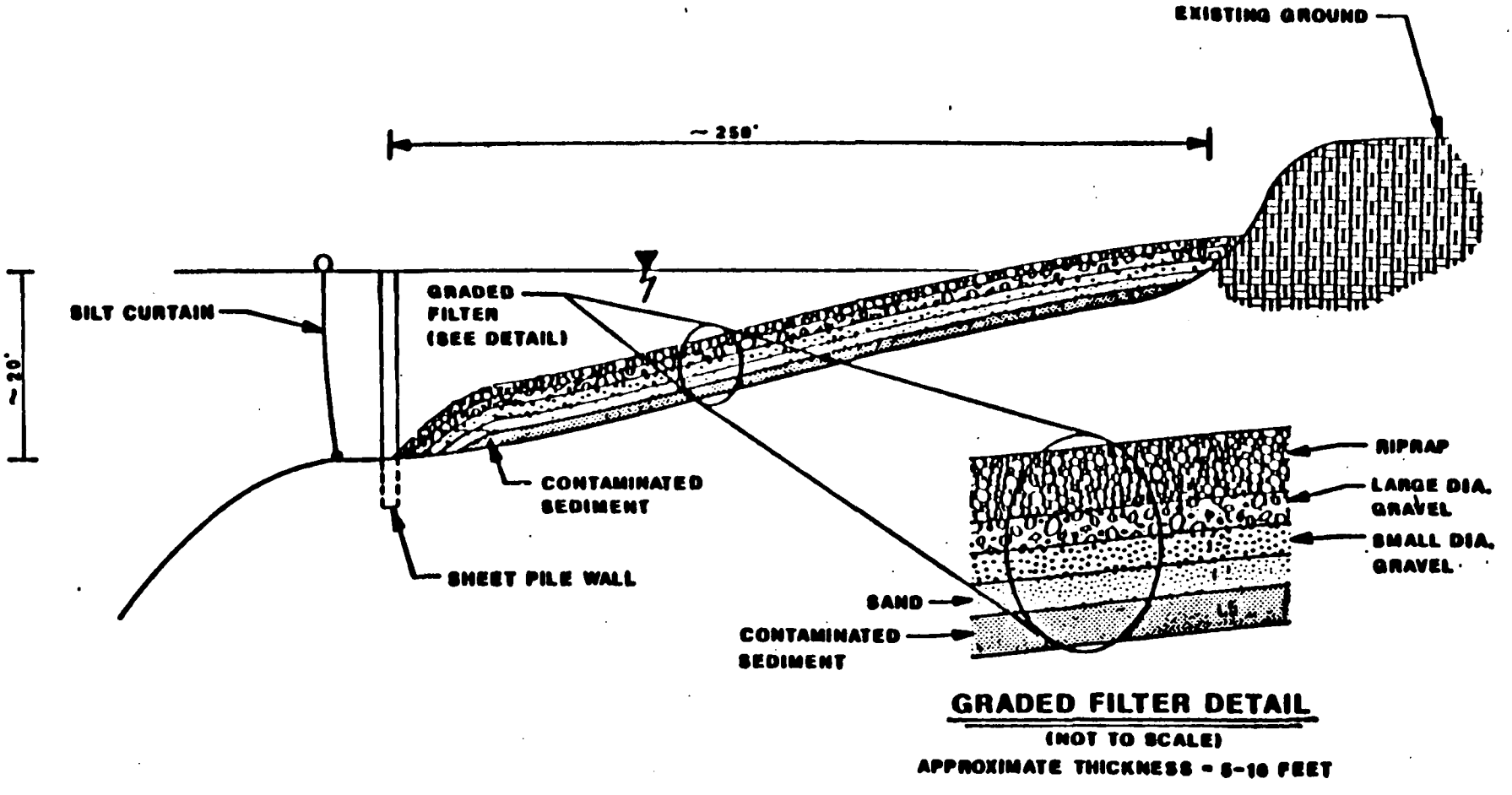


FIGURE 4
DESIGN CONCEPTS: IN-PLACE CONTAINMENT OF SEDIMENTS

SOURCE: G.M. DRAFT FEASIBILITY STUDY, NOVEMBER 1989

APPENDIX 2

TABLES

TABLE 1

VOLUMES OF PCB CONTAMINATED MATERIAL
AT THE G.M. SITE

Site Area	Volume of Material with PCBs > 1 ppm (yd^3)	Volume of Material with PCBs > 10 ppm (yd^3)	Volume of Material with PCBs > 25 ppm (yd^3)	Volume of Material with PCBs > 50 ppm (yd^3)	Volume of Material with PCBs > 500 ppm (yd^3)
River Sediments	62,000	34,000	29,000	24,000	16,000
Lagoons	103,000	91,000	84,000	83,000	42,000
North and East Disposal Areas	311,000	225,000	195,000	126,000	76,000
Industrial Landfill	442,000	424,000	420,000	316,000	305,000
Reservation Soils*	15,000	15,000	15,000	15,000	15,000
Other Areas	60,000	34,000	4,000	1,000	0
TOTAL	993,000	823,000	747,000	565,000	454,000

where: ppm = parts per million
yd^3 = cubic yards

* Calculation of Reservation soil volumes is based on a 1 ppm action level.

Source: Draft Feasibility Study for G.M. Site, November 1989

TABLE 2
SUMMARY OF RI RESULTS
GM OLD MASSENA
(ABBREVIATIONS DEFINED AT END OF TABLE)

AFFECTED AREA	CONSTITUENTS	CONCENTRATION RANGE (FREQUENCY)	COMMENTS
1. NORTH DISPOSAL AREA			
a. Soils/Sludge	PCBs (Total)	S: 0.27 - 12,000 ppm (28/28) Median = 6.1 ppm S/S: 0.13 - 31,000 ppm (56/61) Median = 30 ppm	Two patterns of PCB concentrations with depth are evident. One indicates decreasing concentration with depth. PCB is at less than 10 ppm by a depth of 11 feet. The second indicates concentration of > 25 ppm at a 20-foot depth.
	VOCs	S: No detects S/S: VC 0.158 ppm (1/9) PCE 0.8 ppm (2/9) Benzene 0.01 ppm (1/9) MEK 0.1 ppm (1/9) DCE 0.3 ppm (1/9)	Fifteen different VOCs detected in soil samples. All VOC concentration values in soil borings were less than 0.3 ppm, with the exception of PCE and DCE in two samples.
	Phenol/Substituted Phenol	S: No detect S/S: Up to 5000 ppm (3/9)	Two borings accounted for the only quantifiable observations of substituted phenols (2,4-dimethyl-phenol, 2-methylphenol, and 4-methylphenol). The highest concentrations of phenols were associated with areas of past waste disposal or treatment.
	PNAs	S: BMDL S/S: 2 Methylnaphthalene 2.0 ppm (1/9)	Eleven PNAs were detected in surficial soils and boring samples. All PNAs, with the exception of 2-methyl-naphthalene, were detected below the MDL.

S = Surface
S/S = Subsurface
BMDL = Below Method Detection Limit
(1/9) = Number of Samples Detected/Number of Samples Analyzed
DCE = 1,2-Trans-dichloroethylene
PCE = Tetrachloroethylene
TCE = Trichloroethylene
MEK = Methyl Ethyl Ketone
VOCs = Volatile Organic Compounds
VC = Vinyl Chloride
PCB's = Polychlorinated Biphenyls
PNA's = Polynuclear Aromatic Hydrocarbons

TABLE 2 (CONTINUED)
SUMMARY OF RI RESULTS
LOVE CANAL NIAGARA

AFFECTED AREA	CONSTITUENTS	CONCENTRATION RANGE (FREQUENCY)	COMMENTS
	Phthalates	S: Up to 2.0 ppm (2/4) S/S: Up to 17 ppm (5/9)	Four phthalate compounds were detected in surficial soil and boring samples. Quantifiable concentrations of phthalate compounds ranged from 0.891 to 17.8 ppm in five of thirteen samples.
	Metals	S: See comment	Only manganese and magnesium were observed at concentrations above those in background samples. Neither constituent warrants consideration for remedial action.
b. Ground Water	PCBs (1248) (MW 24B, MW14A, MW14B)	Not Detected to 0.0041 ppm	Results indicate lower concentrations in Phase II RI in comparison to Phase I RI.
2. EAST DISPOSAL AREA			
a. Soils	PCBs (Total)	S: Up to 41,000 ppm (60/68) Median = 12 ppm S/S: Up to 30,000 ppm (87/89) Median = 2.5 ppm	Most of the PCBs were found within the boundaries of previous sludge disposal areas. Three additional areas adjacent to the sludge disposal areas were also defined.
	VOCs	S: MEK up to 0.01 ppm (1/8) S/S: Xylene up to 0.008 ppm (4/18) Toluene up to 0.01 ppm (4/18)	Phase I and Phase II RI results indicated the presence of eleven VOCs. These concentrations are low and do not warrant further assessment.

S = Surface
S/S = Subsurface
BMDL = Below Method Detection Limit
(1/9) = Number of Samples Detected/Number of Samples Analyzed
DCE = 1,2-Trans-dichloroethylene
PCE = Tetrachloroethylene
TCE = Trichloroethylene
MEK = Methyl Ethyl Ketone
VOCs = Volatile Organic Compounds
VC = Vinyl Chloride
PCB's = Polychlorinated Biphenyls
PNA's = Polynuclear Aromatic Hydrocarbons

TABLE 2 (CONTINUED)
SUMMARY OF RI RESULTS
GMC-CID MASSENA

AFFECTED AREA	CONSTITUENTS	CONCENTRATION RANGE (FREQUENCY)	COMMENTS
	Phenols/Substituted Phenols	S: Up to 11,000 ppm (16/22) S/S: Up to 8,000 ppm (3/18)	Phenol and three substituted phenols (see 1A) were detected in soil and boring samples. Phase I and II results indicate they were present within and below waste materials but not in surrounding soils.
	PNAs	S: BMDL to 0.6 ppm (2/8) S/S: BMDL to 0.6 ppm (3/18)	Sixteen PNAs were detected in soil and boring samples. The highest PNA concentration reported was 0.6 ppm.
	Phthalates	S: Up to 2 ppm (3/8) S/S: Up to 8 ppm (18/18)	Five different phthalate compounds were detected in soil and sludge samples. All of these compounds correspond to areas of past waste disposal.
	Metals	See Comments	Means and ranges typically comparable to background.
b. Ground Water	PCBs (1248) (MW-27A)	Up to 0.0017 ppm	Detected in first round of sampling but could not be confirmed by three subsequent rounds.
	Phenol (MW-27A&B)	Up to 0.06 ppm	Two rounds of Phase I RI results indicated presence of phenols. The two rounds of Phase II RI indicated no detectable phenols.

S = Surface
S/S = Subsurface
BMDL = Below Method Detection Limit
(1/9) = Number of Samples Detected/Number of Samples Analyzed
DCE = 1,2-Trans-dichloroethylene
PCE = Tetrachloroethylene
TCE = Trichloroethylene
MEK = Methyl Ethyl Ketone
VOCs = Volatile Organic Compounds
VC = Vinyl Chloride
PCB's = Polychlorinated Biphenyls
PNA's = Polynuclear Aromatic Hydrocarbons

TABLE 2 (CONTINUED)
SUMMARY OF RI RESULTS
GM/C-CFD MASSENA

AFFECTED AREA	CONSTITUENTS	CONCENTRATION RANGE (FREQUENCY	COMMENTS
3. INDUSTRIAL LANDFILL a. Soils/Waste	PCBs (Total)	S: Up to 45 ppm (27/27) Median = 1.7 ppm S/S: Up to 4300 ppm (80/90) Median = 1.7 ppm	
	VOCs	S: BMDL S/S: TCE up to 1.1 ppm (2/12)	Ten different VOCs were detected in boring samples. Of fourteen detectable values in soil boring samples, 9 were found in two samples. Contamination is generally isolated and at low levels.
	Phenols/Substituted Phenols	S: Up to 8 ppm (1/6) S/S: Up to 51 ppm (2/12)	2,4-dimethylphenol, 4-methylphenol and phenol were detected in two soil boring samples.
	PNAs	S: BMDL S/S: Up to 3 ppm (2/12)	Fifteen different PNAs were detected in soil boring and surface soil samples. Twenty-three of 32 observations of PNAs were BMDL. One sample accounted for 13 of 32 PNA occurrences.
	Phthalates	S: Up to 4 ppm (2/6) S/S: Up to 5 ppm (12/12)	Four phthalates were detected in soil boring and surface soil samples from this area. In five of the 18 samples, the concentrations are below MDL.

S = Surface
S/S = Subsurface
BMDL = Below Method Detection Limit
(1/9) = Number of Samples Detected/Number of Samples Analyzed
DCE = 1,2-Trans-dichloroethylene
PCE = Tetrachloroethylene
TCE = Trichloroethylene
MEK = Methyl Ethyl Ketone
VOCs = Volatile Organic Compounds
VC = Vinyl Chloride
PCB's = Polychlorinated Biphenyls
PNA's = Polynuclear Aromatic Hydrocarbons

TABLE 2 (CONTINUED)
SUMMARY OF RI RESULTS
GOC OLD NASSIMA

AFFECTED AREA	CONSTITUENTS	CONCENTRATION RANGE (FREQUENCY)	COMMENTS
	Metals	See Comments	Five samples out of 20 showed levels above background (Al, As, Co, Cu, Cr, Fe, Ni, Zn). The occurrence of trace metals is probably due to the presence of foundry sands and not to the disposal of PCB waste oils.
b. Ground Water	PCBs (1248) (MW-16A&B)	Up to 1.3 ppm	Only samples from well 16A and 16B showed a consistent occurrence (PCBs). The Phase II data indicate the extent of hazardous substance migration in ground water in the vicinity of the landfill is more limited than shown by the Phase I RI data.
	VOCs (MW-16B)	1,2 DCE up to 0.686 ppm (6/6) TCE up to 0.050 ppm (4/6) VC 0.050 ppm (4/6)	Only samples from well MW-16B showed a consistent pattern of VOC occurrence. Phase II RI data showed lower concentrations.
	Phenols/Substituted Phenols	Up to 0.024 ppm	Concentrations decreased from Phase I RI results to Phase II RI results.
	PNAs (MW-26B)	Up to 0.188 ppm	Four PNAs detected in MW-26B in Phase I and not Phase II.
	Phthalates (several wells)	Up to 0.082 ppm (2/16)	Phthalates were seen in the Phase I RI but not in Phase II RI sampling of wells.
	Metals	See Comments	All were within background concentrations.

S = Surface
S/S = Subsurface
BMDL = Below Method Detection Limit
(1/9) = Number of Samples Detected/Number of Samples Analyzed
DCE = 1,2 Trans dichloroethylene
PCE = Tetrachloroethylene
TCE = Trichloroethylene
MEK = Methyl Ethyl Ketone
VOCs = Volatile Organic Compounds
VC = Vinyl Chloride
PCB's = Polychlorinated Biphenyls
PNA's = Polynuclear Aromatic Hydrocarbons

TABLE 2 (CONTINUED)
SUMMARY OF RI RESULTS
GAC CID MASSENA

AFFECTED AREA	CONSTITUENTS	CONCENTRATION RANGE (FREQUENCY)	COMMENTS
4. LAGOONS			
a. Sludges	PCBs (1248)	Up to 750 ppm (19/19)	All lagoons were found to have PCBs in and/or beneath sludge within the lagoons and soil immediately adjacent to lagoons.
	VOCs	PCE up to 6 ppm (5/14) Toluene up to 28 ppm (14/14) TCE up to 3 ppm (5/14) VC up to 2 ppm (7/19) Xylenes up to 1.5 ppm (4/14)	Thirteen VOCs were detected in soil and/or sludges from the lagoon area. VOCs showed up most often and were generally at the highest concentrations in sludges from the 350,000-gallon lagoon. Eight different VOCs were detected from sludges from the 500,000-gallon lagoon. Five different VOCs were detected in the 1.5 m-gallon lagoon.
	Phenols/Substituted Phenols	Up to 26,000 ppm (14/14)	Constituents included phenol, 2,4-methylphenol, and 4 methyl-phenol.
	PNAs	Up to 30 ppm (3/14)	Nine PNAs were detected in sludges from one or more of the lagoons. Sixteen of 37 reported occurrences of PNAs were of concentrations below the MDL.
	Phthalates	Up to 37 ppm (3/14)	Only one phthalate was detected in the 350,000-gallon lagoon. Three phthalates were detected in the 1.5 M-gal lagoon. Two phthalates were detected in the 500,000-gallon lagoon.

S = Surface
S/S = Subsurface
BMDL = Below Method Detection Limit
(1/9) = Number of Samples Detected/Number of Samples Analyzed
DCE = 1,2 trans-dichloroethylene
PCE = Tetrachloroethylene
TCE = Trichloroethylene
MEK = Methyl Ethyl Ketone
VOCs = Volatile Organic Compounds
VC = Vinyl Chloride
PCB's = Polychlorinated Biphenyls
PNA's = Polynuclear Aromatic Hydrocarbons

TABLE 2 (CONTINUED)
SUMMARY OF RI RESULTS
GE OLD MASSENA

AFFECTED AREA	CONSTITUENTS	CONCENTRATION RANGE (FREQUENCY)	COMMENTS
	Nitrosodiphenylamine	Up to 268 ppm (4/14)	Detected in the 150,000-gallon lagoon.
	Metals	See Comments	Eleven of 23 metals exceeded background, notably C, Pb, Hg.
b. Soils	PCBs (Total)	S: Up to 280 ppm (11/11) Median = 7.6 ppm S/S: Up to 41 ppm (38/43) Median = 11 ppm	PCB concentrations ranged from BMDL to 280 ppm.
	VOCs	S: No detects S/S: MEK up to 0.1 ppm (4/6)	Five VOCs were detected in soil samples. With the exception of MEK, all values of VOCs were less than 0.01 ppm.
	Phenols/Substituted Phenols	S: No detects S/S: Up to 4 ppm (2/6)	All concentrations of compounds in this group were observed below the MDL, with the exception of phenol in one sample.
	PNAs	S: BMDLs S/S: BMDLs	Six PNAs were detected (below the MDL) in the surface soil samples.
	Phthalates	S: BMDL (1/6) S/S: Up to 17 ppm (6/6)	The surface soil sample contained only di-n-butylphthalate at below MDL. Bis(2-ethyl hexyl) phthalate and di-n-butylphthalate were detected below the MDL in all boring samples.
	Metals	See Comments	Ni, Ca, Mg were found above background.

S = Surface
S/S = Subsurface
BMDL = Below Method Detection Limit
(1/9) = Number of Samples Detected/Number of Samples Analyzed
DCE = 1,2-Trans-dichloroethylene
PCE = Tetrachloroethylene
TCE = Trichloroethylene
MEK = Methyl Ethyl Ketone
VOCs = Volatile Organic Compounds
VC = Vinyl Chloride
PCB's = Polychlorinated Biphenyls
PNA's = Polynuclear Aromatic Hydrocarbons

TABLE 2 (CONTINUED)
SUMMARY OF RI RESULTS
GMC-CED MASSENA

AFFECTED AREA	CONSTITUENTS	CONCENTRATION RANGE (FREQUENCY)	COMMENTS
. Ground Water	PCBs (1248) (228)	Up to 0.087 ppm (at 228)	The RI I data from MW238 suggested migration of PCBs from the 10 M-gallon lagoon. Both Phase II samples from MW-238 were free of detectable PCBs. This makes it uncertain if PCBs are migrating by a ground water pathway. Three of four rounds from MW-148 and MW-248 produced reportable PCB levels indicating the probable existence of PCBs in ground water.
	VOCs	See comments	A few constituents were noted at low concentrations.
	Phenols/Substituted Phenols (228)	Up to 2.7 ppm (at 228)	Phenols were detected in all rounds from MW-228.
	PNAs	No detects	
	Phthalates (228)	Up to 0.029 ppm (at 228)	Detected above BMDL in MW-228 and MW248 in one of four rounds.
	Metals	See comments	All were within background concentrations. Mercury was reported at 2.6 ug/L (over the MCL) from MW-228. This was not confirmed by other RI sampling rounds or NYDEC split samples.

S = Surface
S/S = Subsurface
BMDL = Below Method Detection Limit
(1/9) = Number of Samples Detected/Number of Samples Analyzed
DCE = 1,2-Trans-dichloroethylene
PCE = Tetrachloroethylene
TCE = Trichloroethylene
MEK = Methyl Ethyl Ketone
VOCs = Volatile Organic Compounds
VC = Vinyl Chloride
PCB's = Polychlorinated Biphenyls
PNA's = Polynuclear Aromatic Hydrocarbons

TABLE 2 (CONTINUED)
SUMMARY OF RI RESULTS
OMC-CFD MASSENA

AFFECTED AREA	CONSTITUENTS	CONCENTRATION RANGE (FREQUENCY)	COMMENTS
5. ST. LAWRENCE RIVER SEDIMENT	PCBs	S: ND - 5,700 (38/39) Median = 24 ppm	Samples generally contained from 2 to 4 times as much Aroclor 1232 as 1248. This is the only location where other than Aroclor 1248 was detected. No measurable concentrations of the 2, 3, 7, 8-isomers of dioxin or furan were observed in any samples.
	VOCs	MEK Up to 0.0321 ppm (7/8)	Significant concentrations of VOCs were not observed.
	Phenols/Substituted Phenols	BMDL	Significant concentrations of acid extractables were not observed.
	Phthalates	Up to 3.22 ppm (8.8)	
	PNAs	Benzo(a)anthracene BMDL to 8 ppm.	Sixteen of PNAs were detected in the eight sediment samples collected adjacent to the site. No measurable concentrations of the 2, 3, 7, 8,-isomers of dioxin or furan were observed in any samples.
	Metals	See Comments	Mercury and selenium were above local background concentrations but within those reported for soils in New York.

S = Surface
S/S = Subsurface
BMDL = Below Method Detection Limit
(1/9) = Number of Samples Detected/Number of Samples Analyzed
DCE = 1,2-Trans-dichloroethylene
PCE = Tetrachloroethylene
TCE = Trichloroethylene
MEK = Methyl Ethyl Ketone
VOCs = Volatile Organic Compounds
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PNA's = Polynuclear Aromatic Hydrocarbons

TABLE 2 (CONTINUED)
SUMMARY OF RI RESULTS
GMC CFD MASSENA

AFFECTED AREA	CONSTITUENTS	CONCENTRATION RANGE (FREQUENCY)	COMMENTS
6. RAQUETTE RIVER	PCBs (Total)		
a. Sediments		S: 0.34 - 2.3 (2/4) Median = 1.3 ppm	In addition, a "Highly localized" IT detect of 240 ppm at outfall was found.
b. Soils on River Bank		S: 0.22 - 32 (10/11) Median = 1.7 ppm	
7. OFF-SITE SOILS (UNNAMED TRIBUTARY)	PCBs (Total)	S: ND - 48 (49/82) Median = 0.59	The spatial distribution of PCBs indicates that runoff over a limited area in the southeast corner of the GMC-CFD facility was the primary route by which PCBs migrated from the facility.
	VOCs	S: MEK upto 0.9 ppm (3/15)	
	Phenols	S: BMDL (1/15)	
	PNAs	S: BMDL (15/15)	
	Phthalates	S: BMDL - 7.99 ppm (1/15)	
	Metals	See Comments	No metals were identified above background levels.

S = Surface
S/S = Subsurface
BMDL = Below Method Detection Limit
(1/9) = Number of Samples Detected/Number of Samples Analyzed
DCE = 1,2-Trans-dichloroethylene
PCE = Tetrachloroethylene
TCE = Trichloroethylene
MEK = Methyl Ethyl Ketone
VOCs = Volatile Organic Compounds
VC = Vinyl Chloride
PCB's = Polychlorinated Biphenyls
PNA's = Polynuclear Aromatic Hydrocarbons

TABLE 3

Summary of Exposure Assumptions and Exposures
via All Pathways for the G.M. Site

Pathway	Most Probable	Worst Case
Fish Ingestion		
Consumption	130 g/day	130 g/day
Fish Concentration	1.7 mg/kg	6.9 mg/kg
Exposure	0.003 mg/kg-day	0.013 mg/kg-day
Wildlife Consumption		
Consumption	6.6 g/day	6.6 g/day
Wildlife Concentration	23 mg/kg	33 mg/kg
Exposure	0.002 mg/kg-day	0.003 mg/kg-day
Soil Ingestion		
Soil Ingestion	39 mg/day (child)	200 mg/day (child)
	10 mg/day (adult)	100 mg/day (adult)
Soil Concentration	0.065 mg/kg	3.3 mg/kg
Exposure	1.1×10^{-7} mg/kg-day	3.5×10^{-6} mg/kg-day
Water Ingestion		
Ingestion	1.4 l/day	2.0 l/day
Water Concentration	1.0 μg/l	7.5 μg/l
Exposure	2×10^{-5} mg/kg-day	2.1×10^{-4} mg/kg-day

TABLE 3 (cont.)

Summary of Exposure Assumptions and Exposures via All Pathways for the G.M. Site

Pathway	Most Probable	Worst Case
Breast Milk		
Ingestion	800 ml/day	800 ml/day
Milk Concentration	0.07 mg/l	0.22 mg/l
Exposure	8.9×10^{-5} mg/kg-day	2.8×10^{-4} mg/kg-day

where:
g = grams
mg = milligrams
kg = kilograms
l = liters
μg = micrograms
ml = milliliter

Source: "Baseline Risk Assessment for GM/Massena Site," prepared by Gradient Corporation for the U. S. Environmental Protection Agency, September 15, 1989.

TABLE 4

Summary of Carcinogenic Risks to Mohawks

Pathway	Most Probable	Worst Case
Fish Ingestion	2.4×10^{-2}	1.0×10^{-1}
Wildlife Consumption	1.7×10^{-2}	2.4×10^{-2}
Soil Ingestion	8.5×10^{-7}	2.7×10^{-5}
Water Ingestion	1.5×10^{-4}	1.7×10^{-3}
Breast Milk	6.8×10^{-4}	2.2×10^{-3}
TOTAL	4.2×10^{-2}	1.3×10^{-1}

Source: "Baseline Risk Assessment for GM/Massena Site," prepared by Gradient Corporation for the U. S. Environmental Protection Agency, September 15, 1989.

TABLE 5

Summary of Noncarcinogenic Effects on Mohawks

Pathway	Most Probable	Worst Case
Fish Ingestion	31.6	128
Wildlife Consumption	21.7	31.1
Soil Ingestion	1.1×10^{-3}	3.5×10^{-2}
Water Ingestion	0.2	2.1
Breast Milk	8.9×10^{-1}	2.8
TOTAL	54.4	164.0

Source: "Baseline Risk Assessment for GM/Massena Site," prepared by Gradient Corporation for the U. S. Environmental Protection Agency, September 15, 1989.

TABLE 6

G.M. SITE CLEANUP LEVELS

Medium	Contaminant	Cleanup Level	Treatment Level
Sediment in the St. Lawrence and Raquette Rivers*	PCBs	1 ppm	≤10 ppm
Sediment in Turtle Creek*	PCBs	0.1 ppm	≤10 ppm
Soil/Sludge on G.M. Property	PCBs Total Phenols	10 ppm 50 ppm	≤10 ppm ** 50 ppm
Soil on the Reservation	PCBs	1 ppm	≤10 ppm
Groundwater	PCBs Total Phenols 1,2 DCE TCE Vinyl Chloride	0.1 ppb 1 ppb 100 ppb 5 ppb 2 ppb	≈65 ppt *** 1 ppb 50 ppb 3 ppb 300 ppt

where:

ppm	= parts per million
ppt	= parts per trillion
1,2 DCE	= 1,2-(trans)-dichloroethylene
TCE	= trichloroethylene
VC	= vinyl chloride

* Cleanup levels given for sediments were used to define PCB hotspots

** In compliance with TSCA regulations, sludge with initial PCB concentrations above 500 ppm is subject to a 2 ppm treatment level

*** Water would be treated to comply with SPDES which currently requires that PCB concentrations in the discharge be non-detectable, down to method detection level, using EPA Laboratory Method Number 608

TABLE 7

ST. REGIS MOHAWK PCB CLEANUP REQUIREMENTS

Medium	Cleanup Standard
Sediments	0.1 ppm
Soil	1 ppm
Groundwater	10 ppt
Air	5 ng/m^3
Surface Water	1 ppt

where:
ppm = parts per million
ng = nanograms
m^3 = cubic meter
ppt = parts per trillion

TABLE 8

COSTS ASSOCIATED WITH SEDIMENT DREDGING AND ON-SITE TREATMENT

Alternative	Construction Cost ($M)	Annual O&M Cost ($K/year)	Present Worth Costs ($M)
Dredging and Biological Treatment	7.7	30	7.7
Dredging and Chemical Destruction	29	12	29
Dredging and Chemical Extraction	22	12	22
Dredging and Thermal Destruction	32	12	32
Dredging and Thermal Extraction	29	12	29
Dredging and Solidification	17	12	17
Dredging and a Combination of Biological Treatment and Thermal Destruction*	21.5	24	21.5

where: O&M = operation and maintenance
$M = millions of dollars
$K = thousands of dollars

Costs are based on an assumption of biological treatment of sediments with PCB concentrations between 1 ppm and 500 ppm and thermal destruction of sediments with PCB concentrations greater than 500 ppm.

Source: Draft Feasibility Study for G.M. Site, November 1989

TABLE 9

COSTS ASSOCIATED WITH EXCAVATION AND ON-SITE TREATMENT OF SOLIDS IN THE NORTH DISPOSAL AREAS, RESERVATION SOILS. SOILS ON G.M. PROPERTY

Alternative	Construction Cost ($M)	Annual O&M Cost ($K/year)	Present Worth Costs ($M)
Excavation and Biological Treatment	25	102	25
Excavation and Chemical Destruction	49	165	49
Excavation and Chemical Extraction	36	165	36
Excavation and Thermal Destruction	56	165	56
Excavation and Thermal Extraction	49	165	49
Excavation and Solidification	27	165	27
Excavation and a Combination of Biological Treatment and Thermal Destruction*	38	267	38

where: O&M = operation and maintenance
$M = millions of dollars
$K = thousands of dollars

Costs are based on an assumption of biological treatment of sediments with PCB concentrations between 1 ppm and 500 ppm and thermal destruction of sediments with PCB concentrations greater than 500 ppm.

Source: Draft Feasibility Study for G.M. Site, November 1989

TABLE 10

COSTS ASSOCIATED WITH LAGOON SOLIDS EXCAVATION
AND ON-SITE TREATMENT

Alternative	Construction Cost ($M)	Annual O&M Cost ($K/year)	Present Worth Costs ($M)
Excavation and Biological Treatment	24	102	24
Excavation and Chemical Destruction	42	165	42
Excavation and Chemical Extraction	31	165	31
Excavation and Thermal Destruction	47	165	47
Excavation and Thermal Extraction	42	165	42
Excavation and Solidification	22	165	22
Excavation and a Combination of Biological Treatment and Thermal Destruction*	47	267	48

where: O&M = operation and maintenance
$M = millions of dollars
$K = thousands of dollars

Costs are based on an assumption of biological treatment of sediments with PCB concentrations between 1 ppm and 500 ppm and thermal destruction of sediments with PCB concentrations greater than 500 ppm.

Source: Draft Feasibility Study for G.M. Site, November 1989

TABLE 11

ESTIMATED WORST CASE TRANSIENT CANCER RISKS AND NONCARCINOGENIC EFFECTS FOR ADULT INDIANS AND REMEDIATION WORKERS DURING IMPLEMENTATION OF REMEDIAL ACTIONS

Alternative	Transient Cancer Risks to Adult Indians	Transient Noncarcinogenic Effects on Adult Indians (Hazard Index)	Transient Cancer Risks to Remediation Workers	Transient Noncarcinogenic Effects on Remediation Workers (Hazard Index)
Capping of the North Disposal Area	4.0×10^{-7}	5.2×10^{-4}	1.6×10^{-5}*	2.1×10^{-2}*
Sediment Dredging with Treatment by a Combination of Biological Treatment and Thermal Destruction	2.1×10^{-5}	2.7×10^{-2}	1.6×10^{-4}	2.0×10^{-1}
Excavation of the North Disposal Area with Treatment by a Combination of Biological Treatment and Thermal Destruction	3.3×10^{-6}	2.1×10^{-3}	3.7×10^{-3}**	4.7**

Risks or hazard indices estimated for North and East Disposal collectively.

Risks or hazard indices estimated for North and East Disposal Areas and Industrial Lagoons collectively.

Source: "Risk Assessment for Five Remedial Alternatives at the G.M. Site," prepared by Gradient Corporation for the U. S. Environmental Protection Agency, April 2, 1990.

TABLE 11 (cont.)

ESTIMATED WORST CASE TRANSIENT CANCER RISKS AND NONCARCINOGENIC EFFECTS FOR ADULT INDIANS AND REMEDIATION WORKERS DURING IMPLEMENTATION OF REMEDIAL ACTIONS

Alternative	Transient Cancer Risks to Adult Indians	Transient Noncarcinogenic Effects on Adult Indians (Hazard Index)	Transient Cancer Risks to Remediation Workers	Transient Noncarcinogenic Effects on Remediation Workers (Hazard Index)
Excavation of the Industrial Lagoons with Treatment by a Combination of Biological Treatment and Thermal Destruction	7.0×10^{-7}	7.7×10^{-4}	3.7×10^{-3}**	4.7**

** Risks or hazard indices estimated for North and East Disposal Areas and Industrial Lagoons collectively.

Source: "Risk Assessment for Five Remedial Alternatives at the G.M. Site," prepared by Gradient Corporation for the U. S. Environmental Protection Agency, April 2, 1990.

TABLE 12

SUMMARY OF COSTS OF SELECTED REMEDY

Component of Selected Remedy	Construction Cost ($M)	O&M Costs ($K/year*)	Present Worth Cost ($M)**
Sediment Dredging with a Combination of Biological Treatment and Thermal Destruction***	21.5	24 (3 years)	21.5
North Disposal Area, Reservation Soil, and G.M. Property Soil Excavation with a Combination of Biological Treatment and Thermal Destruction***	38	267 (5 years)	38
Active Industrial Lagoon Excavation with a Combination of Biological Treatment and Thermal Destruction***	39.6	267 (3 years)	24.6****
Inactive Industrial Lagoon Excavation with a Combination of Biological Treatment and Thermal Destruction***	25.8	267 (3 years)	26
Groundwater Recovery and Treatment	2	197 (30 years)	4
TOTAL*****	84.8	464 (years 1 - 8) 197 (years 9 - 10) 464 (years 11 - 13) 197 (years 14 - 30)	78****

O&M begins after completion of construction.

Based on an assumed discount rate of five percent

TABLE 12 (cont.)

SUMMARY OF COSTS OF SELECTED REMEDY

*** Costs are based on an assumption of biological treatment of sediments with PCB concentrations between 1 ppm and 500 ppm and thermal destruction of sediments with PCB concentrations greater than 500 ppm.

**** Present worth costs reflect the assumption that active lagoons will be remediated in ten years.

***** Reflects the savings (in fixed incineration and biological treatment costs) realized by utilizing the same treatment technologies for all areas of the Site.

TABLE 13

MAJOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, AMONG OTHERS, ASSOCIATED WITH THE SELECTED REMEDY

Chemical-Specific ARARs

- Safe Drinking Water Act
  - Maximum Contaminant Level (MCL) for trichloroethylene and vinyl chloride
- St. Regis Mohawk Tribe Requirements
  - PCB cleanup levels in soil, sediment, air, water, and groundwater
- Clean Air Act
  - National Ambient Air Quality Standards at 40 CFR Part 50
- New York State Requirements
  - Groundwater regulations at 6 NYCRR Part 703
  - Surface water regulations at 6 NYCRR Part 701, including Appendix 31
  - Air quality standards at 6 NYCRR Part 257

Action-Specific ARARs

Toxic Substances Control Act

- 40 CFR 761.60-79 PCB disposal requirements

Resource Conservation and Recovery Act

- Closure requirements at 40 CFR 264 Subparts G, K, L, and N
- Groundwater monitoring requirements at 40 CFR 264 Subpart F
- Incineration requirements in 40 CFR 264 Subpart O
- Design and operating requirements for a new unit at 40 CFR Subpart N
- Design and operating requirements for tank at 40 CFR Subpart J
- Generator requirements at 40 CFR 262
- Transporter requirements at 40 CFR 263
- Land Dispsosal Restrictions (for hazardous treatment residuals only) at 40 CFR 268

TABLE 13 (cont.)

MAJOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, AMONG OTHERS. ASSOCIATED WITH THE SELECTED REMEDY

- Clean Water Act
  - Best Available technology and monitoring requirements at 40 CFR 122.44(a, e, i)
  - Best Management Practices program requirements at 40 CFR 125.100
- Rivers and Harbors Act
  - Dredging requirements at 33 CFR 320-330
- New York State Requirements
  - Solid Waste Management Facility regulations at 6 NYCRR Part 360
  - Final status standards for hazardous waste facilities at 6 NYCRR Part 373-2
  - Implementation of National Permit Discharge Elimination System at 6 NYCRR 750-757

Location-Specific ARARs

- Executive Orders 11988 and 11990
  - Floodplains management and protection of wetlands at 40 CFR 6.302 and 40 CFR 6. Appendix A
- Fish and Wildlife Coordination Act
  - Protection of endangered species and wildlife at 33 CFR Parts 320-330 and 40 CFR 6.302
- National Wildlife Historical Preservation Act
  - Preservation of historic properties at 36 CFR 65 and 36 CFR 800
- Endangered Species Act
  - Protection of endangered species at 50 CFR 200, 50 CFR 402
- Clean Water Act
  - Section 404 requirements for dredge spoil discharge at 40 CFR 230 and 33 CFR Parts 320-330
- Wild and Scenic Act

  Protection of recreational river at 40 CFR 6.302(e)

TABLE 13 (cont.)

MAJOR APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, AMONG OTHERS, ASSOCIATED WITH THE SELECTED REMEDY

- Coastal Zone Management Act
  - Conduct activities in manner consistent with State program
- New York State Requirements
  - Wetlands land use regulations at 6 NYCRR Part 661
  - Freshwater wetlands requirements at 6 NYCRR 662-665
  - Endangered species requirements at 6 NYCRR 182
  - Coastal zone management policies at 1 NYCRR Part 600

"To Be Considered" Requirements

- Toxic Substances Control Act
  - 40 CFR 761.120-135 PCB Spill Policy
- Safe Drinking Water Act
  - 40 CFR 141.61 and 54 FR, May 22, 1989, 22062: Proposed MCLs for PCB and 1,2 - trans-dichloroethylene
- Clean Water Act interim sediment criteria for PCBs, EPA, April 1988
- New York State sediment criteria for PCBs
- Resource Conservation and Recovery Act clean closure level for phenol, EPA, October, 1987

APPENDIX 3

NYSDEC AND TRIBAL LETTERS OF CONCURRENCE

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233 - 7010

Thomas C. Jorling
Commissioner

Mr. Richard L. Caspe, P.E.
Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, NY 10278

DEC 1 0 1990

Dear Mr. Caspe:

Re: General Motors - Central Foundry Division Site
Draft Record of Decision (ROD)
NYS Site #6-45-007

New York State Department of Environmental Conservation supports the selected remedies as presented in the revised draft ROD of December 4, 1990 for remediation of the contaminated areas associated with the General Motors (GM) site that are the subject of this operable unit. The Department's position regarding the cleanup levels, as stated in our previous letter dated September 27, 1990, is still pertinent to this revised version.

If you have any questions concerning this matter, please contact Michael J. O'Toole, Jr., P.E., at (518) 457-5861.

Sincerely,

Edward O. Sullivan

Edward O. Sullivan
Deputy Commissioner

cc: G. Pavlou, USEPA
L. Carson, USEPA
R. Tramontano, NYSDOH
J. Privitera/D. Sommer, NYSDOL

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233 -7010

Thomas C. Jorling
Commissioner

Mr. Richard L. Caspe, P.E.
Director
Emergency and Remedial Response Division
U. S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

SEP 2 7 1990

Dear Mr. Caspe:

Re: General Motors - Central Foundry Division Site
Draft Record of Decision (ROD)
NYS Site #6-45-007

New York State Department of Environmental Conservation supports the selected remedies as presented in the draft ROD of September 26, 1990 for remediation of the contaminated areas associated with the General Motors (GM) site that are the subject of this operable unit.

The Remedy selected by USEPA is appropriate, and it is a significant step in the direction of remediating high levels of contamination in the Massena area. The Department acknowledges USEPA's progressive view in selecting cleanup levels of 1 ppm for sediment and 10 ppm for soil which will go a long way in minimizing the risk presently presented by the contamination. However, as the ROD acknowledges, this cleanup standard will result in residual risk to the environment. Potential injuries related to residual risk after remediation has been implemented will be quantified and evaluated from a natural resource damage perspective. The quantification of this residual risk will form the basis for the State's pursuit of monetary damages against GM and others for natural resource damages. Obviously, the greater the residual risk from lingering contamination, the more the State will seek in monetary damages from GM. Therefore, while the Department accepts USEPA's proposed cleanup levels, we strongly encourage GM to eliminate as much of the contamination as possible, while it is in the process of remediating the environs of this site and to pursue the lowest possible cleanup level that is feasible under conditions existing.

If you have any questions concerning this matter, please contact Mr. Michael J. O'Toole, Jr., P.E. at (518) 457-5861.

Sincerely,

Edward O. Sullivan
Deputy Commissioner

cc: G. Pavlou, USEPA
L. Carson, USEPA
R. Tramontano, NYSDOH
J. Privitera/D. Sommer, NYSDOL

SAINT REGIS MOHAWK TRIBE

TRIBAL COUNCIL CHIEFS
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TRIBAL CLERK
CAROL HERNE
TRIBAL ADMINISTRATOR
SAKAKOHE PEMBLETON

December 7, 1990

Mr. Constantine Sidamon-Eristoff
Regional Administrator
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

Re: Draft Record of Decision for General Motors Central Foundary Division Site, Massena, New York

Dear Mr. Sidamon-Eristoff:

The Saint Regis Mohawk Tribe generally supports and concurs with the draft Record of Decision (ROD) provided to us on December 5, 1990, which selects remedies for contaminated areas on and adjacent to the General Motors site that are part of this first operable unit.

The Saint Regis Mohawk Tribe has indicated that its primary concern is protection of the Mohawk people's health and environment through the expeditious and permanent cleanup of the site. To this end, the Tribe supports the removal of contamination from the Reservation and comprehensive controls which ensure that there will be no further migration of contamination from the General Motors site onto the Reservation or into the environment utilized by the Mohawk people. Consequently, the Tribe advocated inclusion of the East Disposal Area in this ROD and voiced its concerns about incineration.

Although EPA decided to include the East Disposal Area in a second ROD which will also address the so-called Industrial Landfill, the Saint Regis Mohawk Tribe is pleased that EPA will proceed expeditiously to issue this second ROD

covering these areas in early 1991. We look forward to working with you to bring about a comprehensive remedy addressing the remaining portion of the site on such an accelerated schedule.

Very truly yours,

Head Chief L. David Jacobs

Chief Lincoln C. White

Chief Norman J. Tarbell

cc: Thomas C. Jorling, NYSDEC

APPENDIX 4

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY
GENERAL MOTORS - CENTRAL FOUNDRY DIVISION SITE
MASSENA, NEW YORK

As part of its public participation responsibilities, the U.S. Environmental Protection Agency (EPA) held a public comment period from March 21, 1990 through June 18, 1990 for interested parties to comment on EPA's draft Feasibility Study (FS) and Proposed Plan for the General Motors - Central Foundry Division Superfund Site (G.M. Site). Both documents presented the alternatives considered for cleaning up the G.M. Site. The Proposed Plan also described EPA's proposed remedy for Site cleanup and solicited public comment on all alternatives under consideration.

EPA held a public meeting on April 25, 1990 at the Massena Township Municipal Building in Massena, New York. At this meeting, representatives from EPA answered questions and received oral and written comments on EPA's Proposed Plan and the other remedial alternatives under consideration. In addition, a public availability session was held in Massena on April 26, 1990. The public availability session was an additional informal opportunity for the public to ask questions about EPA's Proposed Plan. No comments were submitted at the public availability session. On May 9, 1990, EPA met with representatives of the Remedial Action Plan Public Advisory Committee (PAC) in Cornwall, Ontario, Canada to receive the PAC's oral and written comments on EPA's Proposed Plan.

In addition to comments received at the public meeting, EPA received written comments and two petitions regarding its Proposed Plan. Responses to significant comments, both oral and written, received during the public comment period are included in this Responsiveness Summary which is part of the Record of Decision (ROD) for the G.M. Site. It also summarizes comments received during the public comment period from G.M., from New York State agencies, from the St. Regis Mohawks, from Canadian citizens and agencies, as well as from the two federal natural resource trustees at the Site, the National Oceanographic and Atmospheric Administration (NOAA) and the Department of Interior (DOI). New York State and the St. Regis Mohawk Tribe have concurred with the first operable unit ROD for the Site.

The Responsiveness Summary provides EPA and the public with a summary of citizens' comments and concerns about the Site as raised during the public comment period, and EPA's responses to those concerns. All comments summarized in this document were factored into EPA's final decision for selection of the remedial alternatives for cleanup of the Site. EPA's selected remedy for the first operable unit at this Site is described in the Decision Summary of the ROD.

This Responsiveness Summary is organized into the following five sections.

I. RESPONSIVENESS SUMMARY OVERVIEW. This section briefly describes the Site and activities conducted to date by EPA and G.M. relative to the Superfund process, and outlines the preferred remedial alternative.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS. This section provides a brief history of community interest and concerns regarding the Site.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED FROM THE LOCAL COMMUNITY AND EPA'S RESPONSES TO THESE COMMENTS. This section summarizes both oral and written comments submitted to EPA by the local community during the public comment period and EPA's responses to these comments. "Local community" means those individuals who have identified themselves as living in the immediate vicinity of the Site and are threatened from a health or environmental standpoint.

IV. COMPREHENSIVE SUMMARY OF SIGNIFICANT LEGAL AND TECHNICAL COMMENTS AND EPA'S RESPONSES TO THESE COMMENTS. This section summarizes other oral and written comments submitted to EPA during the public comment period and EPA's responses to these comments. It is comprised of specific legal and technical questions and, where necessary, elaborates with technical detail on answers covered in Part III.

V. REMAINING CONCERNS. This section discusses community concerns that EPA will be aware of as it prepares to undertake the remedial designs and remedial actions at the Site.

APPENDICES

There are four appendices attached to this document. They are as follows:

APPENDIX A: Proposed Plan

APPENDIX B: Public Notice that was printed in the Massena, New York newspaper on March 21, 1990 to announce the public meeting and public comment period

APPENDIX C: Sign-in sheets of attendees at the April 25, 1990 public meeting and the April 26, 1990 public availability session

APPENDIX D: Written comments received by EPA during the public comment period and summarized in Section IV of this Responsiveness Summary. EPA's

responses to the written comments are also included in Section IV of this Responsiveness Summary.

I. RESPONSIVENESS SUMMARY OVERVIEW

A. SITE DESCRIPTION

The Site, which includes an active G.M. manufacturing plant, is located in Massena, New York, in St. Lawrence County. G.M. has operated an aluminum casting plant at the Site since 1959. From 1968 to 1980, polychlorinated biphenyls (PCBs) were a component of the hydraulic fluids used in the plant's diecasting machines. PCBs provided protection against fire and thermal degradation in the high temperature environment of the diecasting machines. G.M. periodically landfilled sludges containing PCBs and other hazardous substances in on-site disposal pits.

The Site, as defined by EPA, consists of several major waste areas. The North and East Disposal Areas and the Industrial Landfill contain PCB contaminated soil, debris, and sludge. The four Industrial Lagoons with nominal sizes of 350,000 gallons, 500,000 gallons, 1.5 million gallons and 10 million gallons contain PCB contaminated liquids, sludges, and solids. The Site also includes PCB-contaminated sediments and associated wetlands of the St. Lawrence and Raquette Rivers and Turtle Creek (formerly called the unnamed tributary on the St. Regis Mohawk Reservation); PCB contaminated soil on the St. Regis Mohawk Indian Reservation and on the banks of the St. Lawrence and Raquette Rivers; PCB-contaminated soil on G.M. property not associated with the specific disposal areas already mentioned; and contaminated groundwater. Approximately 253,000 cubic yards of PCB contaminated material are being addressed in the first operable unit ROD for the Site.

B. SITE ACTIVITIES

The G.M. Site was placed on the Superfund National Priorities List (NPL) in September 1983 as a result of G.M.'s past waste disposal practices. G.M. indicated a willingness to perform the Remedial Investigation and Feasibility Study (RI/FS) for the Site. On April 16, 1985, EPA and G.M. entered into an Administrative Order on Consent (Index No. II CERCLA-50201) for G.M.'s performance of the RI/FS. Draft and Phase II RI reports were submitted to EPA in May 1986 and May 1988, respectively.

G.M. performed additional river sampling in February 1989, and submitted a report on the additional sampling to EPA in May 1989. On June 9, 1989, EPA approved the RI report, which consists of the draft RI report, the Phase II RI report and the sediment sampling report, for the Site. The RI report delineated those areas in need of remediation throughout the Site. G.M. submitted the draft FS report to EPA in November 1989.

C. SUMMARY OF PREFERRED REMEDIAL ALTERNATIVES PRESENTED IN THE EPA PROPOSED PLAN

The following is a summary of the remedial alternatives evaluated within the Draft FS and the Proposed Plan. Alternatives which were identified as EPA's preferred alternative in the March 1990 Proposed Plan are highlighted.

Area 1: Contaminated River and Tributary Sediments

- No Action for the River Sediments
- In-Place Containment of River Sediments
- Sediment Dredging and On-Site Treatment

Area 2: North and East Disposal Areas, Contaminated Soils on the St. Regis Mohawk Reservation, Contaminated Soils on G.M. Property

- No Action for the North and East Disposal Areas, Reservation Soils and Soils on G.M. Property
- Capping of the North and East Disposal Areas, Reservation Soils, and Soils on G.M. Property
- Excavation and On-Site Treatment of Solids in the North and East Disposal Areas, Reservation Soils, and Soils on G.M. Property
- Excavation and On-Site Disposal of Solids in the North and East Disposal Areas, Reservation Soils, and Soils on the G.M. Property

Area 3: Industrial Landfill (EPA did not specify a preferred alternative for the Industrial Landfill but instead solicited comment on the public's preference regarding its remediation).

- No Action for the Industrial Landfill
- Capping of the Industrial Landfill
- Industrial Landfill Excavation and On-Site Treatment
- Industrial Landfill Solids Excavation with On-Site Disposal

Area 4: Industrial Lagoons

- No Action for the Lagoons
- Lagoon Solids Excavation and On-Site Treatment
- Lagoon Solids Excavation with On-Site Disposal

Area 5: Ground Water

- No Action for Ground Water
- Ground Water Containment
- Ground Water Recovery and Treatment

D. SUMMARY OF EPA'S SELECTED REMEDIAL ALTERNATIVE

This action, or "operable unit," is the first of two operable units that are planned for the Site. The second operable unit will address the threats resulting from the East Disposal Area and the Industrial Landfill at the Site.

The major components of the selected remedy include:

- Dredging and excavation of sediments and soils from PCB contaminated areas in the St. Lawrence and Raquette Rivers, Turtle Creek, and associated riverbanks and wetlands;

- Interim surface runoff control to prevent migration of contamination from the East Disposal Area;

- Excavation of PCB-contaminated sludges, soil, and debris in the North Disposal Area, in and around the four Industrial Lagoons, and in other areas on G.M. property (two of the four lagoons, which are currently in use by G.M., will be remediated when they are taken out of service);

- Excavation of PCB-contaminated soil on St. Regis Mohawk Reservation land adjacent to the G.M. facility;

- Recovery and treatment of groundwater downgradient from the Site with discharge of treated groundwater to the St. Lawrence River; and

- Treatment of dredged/excavated material by either biological treatment (or another innovative technology which has been demonstrated to achieve site treatment goals) or thermal destruction to be determined by EPA following treatability testing. Treatment residuals will be disposed on-site. Other PCB treatment technologies will be tested concurrently with biological treatment so that EPA will have additional information in the event that biological treatment proves to be unsatisfactory for treatment of any Site material. EPA will select the treatment technologies to be employed, in consultation with NYSDEC and the St. Regis Mohawk Tribe.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERN

Because of the high level of interest in the Site, EPA has implemented a community relations program throughout the RI/FS activities at the Site. This has included both formal and informal meetings with local officials, members of the St. Regis Mohawk Tribe, New York State representatives, Canadian officials and citizens, community and environmental groups, and other interested

citizens. EPA has also provided a Technical Assistance Grant (TAG) to the Akwesasne Task Force on the Environment (members of the St. Regis Mohawk Tribe) to assist them in their efforts to fully participate in the Superfund decision-making process for the Site.

In November 1988, EPA conducted a workshop on the various technologies available to remediate PCB-contaminated soils, sludges, and ground water. EPA also prepared and distributed eleven fact sheets to update the public about on-site activities and to describe the various alternatives that could be considered to remediate the PCB-contaminated media at the Site.

It should be noted that the St. Regis Mohawk Tribe has had a change in leadership since the close of the EPA public comment period. Consequently, the Tribe, in a letter to EPA dated October 31, 1990, provided additional comments to those which were submitted during the public comment period. EPA has, in this Responsiveness Summary, presented and responded to those comments submitted by the Tribe during the public comment period. However, EPA considered the Tribe's October 31, 1990 comments in finalizing the first operable unit ROD. The St. Regis Mohawk Tribe has concurred with the first operable unit ROD which reflects EPA's consideration of the October 31, 1990 comments. A copy of the Tribe's October 31, 1990 letter to EPA is contained in the Administrative Record for this Site.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA'S RESPONSES TO THESE COMMENTS

Comments raised by the local community during the public comment period for the Site and EPA's responses to them are summarized below. Comments submitted during the public comment period are organized into the following eight general categories:

- Preference for EPA's or G.M.'s Proposed Cleanup Plan
- International Impact of G.M. Site Contamination
- Selection of Industrial Landfill Remedial Alternatives
- River Sediment Remedial Alternatives
- Effectiveness of Remediation Techniques
- Timeframe for Remediation
- Liabilities and Responsibilities
- Other Concerns

Although EPA sought public comment on remediation of the East Disposal Area and the Industrial Landfill, EPA has opted to defer selection of remedial alternatives for these areas to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs.

A. PREFERENCE FOR EPA'S OR G.M.'S PROPOSED CLEANUP PLAN

During the public comment period, G.M. put forth its own plan for Site remediation which included in-place containment of river sediments with investigation of natural biodegradation in these areas, excavation and treatment of Reservation soil and soil in the North Disposal Area, excavation and treatment of material in the 350,000 gallon and 1.5 million gallon inactive lagoons, in-place containment of material in the East Disposal Area and Industrial Landfill with investigation of natural biodegradation of material in these areas, and groundwater recovery and treatment.

Comment: The Mayor of Massena, New York, several other local officials, representatives from G.M., and G.M. plant employees expressed support for G.M.'s alternative cleanup plan instead of the EPA Proposed Plan. Generally, these commentors referenced the higher cost of the EPA Proposed Plan, the short-term risks associated with dredging and excavation, and concerns about the potential impacts associated with incineration of PCB-contaminated soils and sediments. These commentors also stated their belief that the G.M. plan was sufficiently protective of public health and the environment.

Response: EPA recognizes that several of the remedial alternatives put forth by G.M. may pose fewer short-term risks than those remedial alternatives proposed by EPA. However, EPA's "Risk Assessment for Five Remedial Alternatives" indicates that none of the remedial alternatives considered in the FS pose unacceptable short-term risks to human health. (EPA defines unacceptable excess cancer risks as those outside the EPA risk range of 10^{-4} to 10^{-6}.) Short-term risks (e.g., during excavation or incineration) to residents of the Reservation can be mitigated through temporary relocation, if necessary. In addition, risks to remediation workers can be mitigated through the use of protective equipment.

EPA also recognizes that there may be impacts associated with incineration and that the public is very concerned about the use of on-site incineration. For this reason, EPA has chosen to minimize the use of on-site incineration in its selected remedy as detailed in the ROD. EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies which will be tested concurrently with biological treatment may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

After carefully balancing the specific characteristics of the Site against the nine criteria as outlined in the National Oil and Hazardous Substances Contingency Plan (NCP), EPA has determined that the long-term effectiveness and permanence afforded by the

selected alternative offset any short-term risks posed by the selected alternative and the higher costs of the selected remedy. The NCP is the regulation promulgated by EPA for implementation of the Superfund statute.

Comment: Representatives of the St. Regis Mohawk Tribe, representatives of Students for Environmental Awareness from the State University of New York at Potsdam, and several interested citizens expressed general support for EPA's Proposed Plan. Permanence of the cleanup remedy and long-term protection of public health and the environment were stressed as more important criteria than cost and short-term risks associated with excavation and treatment.

Response: EPA has determined that the selected remedy as outlined in the ROD represents the maximum extent to which permanent solutions and treatment technologies can be used in a cost-effective manner for the first operable unit at the G.M. Site. Of those alternatives that are protective of human health and the environment and meet the requirements of other environmental laws and regulations, the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, and volume through treatment, short-term effectiveness, implementability, and cost while also considering the statutory preference for treatment as a principal element and considering State, Tribe and community acceptance. Among the treatment alternatives considered for the various areas of the Site, the major tradeoffs that provided the basis for EPA's remedy selection were proven effectiveness of incineration and the cost of biological treatment.

B. INTERNATIONAL IMPACT OF G.M. SITE CONTAMINATION

Comment: A citizen from Cornwall, Ontario expressed appreciation to EPA for encouraging Canadian participation and comment in the decision-making process for selecting a remedial alternative for the Site. The citizen referenced Article 4 of the Boundary Waters Treaty of 1909 in which the United States and Canada agreed "not to pollute the Boundary Waters and not to pollute waters crossing the Boundary." This citizen requested that EPA formalize a relationship with the Canadian Government to deal with the Site, and ultimately to deal with two other neighboring sites impacting Canadian waters.

Response: EPA recognizes the potential impacts of the Site on Canadian citizens and has, within the constraints of the Superfund regulations, endeavored to involve all interested Canadian citizens and local officials, as well as their U.S. counterparts and members of the Mohawk Nation, in its decision-making process.

C. SELECTION OF INDUSTRIAL LANDFILL REMEDIAL ALTERNATIVES

Comment: An interested citizen stated that the Industrial Landfill should be excavated and treated. He further noted that by modifying some of the design assumptions, EPA could significantly reduce the short-term health risks associated with the excavation that are identified in the Risk Assessment.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

Comment: An interested citizen questioned whether the Industrial Landfill was secure.

Response: The Industrial Landfill cannot be considered secure since recent sampling results from groundwater monitoring wells surrounding the Industrial Landfill indicate that PCBs are leaching from the Landfill. Although the Industrial Landfill has an interim cap which was designed to reduce leachate production, the Industrial Landfill was designed prior to the passage of the Resource Conservation and Recovery Act (RCRA) and the Toxic Substances Control Act (TSCA) and does not meet the requirements of these laws.

The interim cap has eliminated the release of air-borne contaminants. However, the Landfill was not constructed with any mechanism for capture of contaminated leachate. Therefore, as part of the selected remedy for this operable unit, EPA will recover and treat contaminated groundwater. This will reduce the continued off-site migration of contaminated groundwater. The Industrial Landfill, itself, will be addressed in the second operable unit ROD.

Comment: Representatives of the St. Regis Mohawk Tribe, representatives of Students for Environmental Awareness from the State University of New York at Potsdam, and several interested citizens stated that the Industrial Landfill should be excavated and treated in the same manner as the other disposal areas. These commentors stated the need for permanence in the remedy selected.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA

will consider this comment when developing a Proposed Plan for the Industrial Landfill.

D. RIVER SEDIMENTS REMEDIAL ALTERNATIVES

Comment: Representatives of the St. Regis Mohawk Tribe, representatives of Students for Environmental Awareness from the State University of New York at Potsdam, and several interested citizens stated that the river sediments cleanup level should be 0.1 parts per million ("ppm") PCBs as proposed by EPA for Tribal properties. These commentors stated that the lowest technically achievable cleanup levels should be implemented for all of the contaminated Site areas.

Response: As required by the Superfund legislation, EPA has recommended a cleanup level on the Reservation that is consistent with promulgated applicable regulations of the St. Regis Mohawk Tribe. EPA believes that the 0.1 ppm level may not be achievable in all areas due to the technical limitations of dredging as a means of removing sediment.

EPA has selected a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers. In selecting a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers, EPA has balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers is achievable and provides an acceptable measure of protection to human health.

Comment: The New York State Department of Environmental Conservation (NYSDEC) suggested that during the remedial design phase EPA should strive to achieve the lowest feasible cleanup levels for PCB-contaminated soils and sediments.

Response: EPA is required to select a cleanup level that is protective of human health and the environment. EPA believes that the selected cleanup levels are protective of human health and the environment. New York State has concurred with the first operable unit ROD.

EPA has selected a soil/sludge PCB cleanup level of 10 ppm on the G.M. facility. This level is based, in part, on EPA's risk assessment for the alternatives considered for the Site which indicates that 10 ppm is protective of the Indian population as well as on EPA recommended PCB soil action levels for industrial areas which were based, in part, on risk to Site workers. In general, EPA recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to remediated areas will be unlimited and because on-site soils impact ground water and surface water quality. The 10 ppm cleanup level is consistent with

PCB cleanup levels selected for industrial areas at other Superfund sites.

Comment: Several interested parties stated that the contamination emanating from the Site and migrating into the St. Lawrence River should be treated in conjunction with contamination emanating from the nearby ALCOA and Reynolds facilities.

Response: EPA concurs and notes that both the cleanups of the ALCOA and Reynolds facilities are currently proceeding under the authority of federal Unilateral Administrative Orders and State Consent Orders. Currently, investigation of the river system and adjacent wetlands surrounding the ALCOA and Reynolds facilities are being conducted to determine the nature and extent of contamination from their facilities and to determine appropriate remediation plans for those facilities. It is EPA's objective to coordinate the cleanup efforts at the G.M. Site with the cleanup of the other facilities to the extent possible.

E. EFFECTIVENESS OF REMEDIATION TECHNIQUES

Comment: Several interested citizens, representatives of the St. Regis Mohawk Tribe, and NYSDEC suggested that EPA conduct concurrent treatability studies on several technologies in addition to bioremediation and incineration to ensure that the most effective treatment method can be quickly implemented.

Response: EPA agrees with this suggestion and has incorporated it in to the selected remedy for the G.M. Site.

Comment: Several interested citizens and local officials questioned the safety of incineration as a remedial alternative. These representatives noted the problems with dioxin experienced by some incinerators and inquired about the safeguards EPA would employ to prevent similar problems.

Response: EPA has reduced the use of incineration in its selected remedy for the Site. EPA notes that while incineration, is a costly technology, it has been proven to be very effective in permanently destroying many types of hazardous wastes. In fact, incineration is currently considered the most effective technology for destroying PCB-contaminated wastes. EPA notes that federal and state regulations require 99.9999% of the PCBs in the waste that is fed into the incinerator must be removed (as measured in the incinerator ash). Although minute amounts of dioxin may be generated during incineration, EPA is committed to working with the community as well as incineration experts to ensure that what incineration must be used at the Site is safe. In this way, EPA will design a system of safeguards as well as a monitoring system to ensure that the incinerator is operating correctly and at optimal conditions.

F. TIME FRAME FOR REMEDIATION

Comment: NYSDEC's Wildlife Pathologist, students from the State University of New York at Potsdam, and several interested citizens stated that the length of time from initially identifying the contamination problems to proposing a cleanup plan at the Site has been too lengthy and stressed the need for more rapid cleanup action.

Response: EPA acknowledges that the cleanup process for the G.M. Site has been lengthy. EPA notes that the size and complexity of the contamination at the Site has contributed to the length of EPA's efforts to date. EPA also notes that some of the "delay" has occurred as a result of its attempt to respond to the enormous amount of comment received during the investigation process.

G. LIABILITIES AND RESPONSIBILITIES

Comment: Several interested citizens and local officials queried EPA as to who would make the final cleanup decision and how the decision would be implemented.

Response: After consideration of all public comments received during the public comment period, EPA selects the remedial alternatives to be implemented at the Site. This decision is documented in the ROD for the Site. Following the signing of the ROD, EPA will begin negotiating with G.M. for implementation of the remedy described in the ROD. G.M. will have 60 days to present a good faith offer to EPA to implement the ROD. If G.M. makes a good faith offer within the 60 days, the Superfund law allows another 60 days for EPA and G.M. to finalize an agreement. If G.M. and EPA finalize an agreement, then G.M., under EPA's supervision and direction, will begin the remedial design phase of the cleanup. If EPA and G.M. cannot come to agreement, then EPA may initiate enforcement action against G.M. or may perform the cleanup using its own contractors and seek to recover its costs from G.M. at a later date.

Comment: An interested citizen questioned who was responsible for any long-term problems that might result from the residual contamination remaining on-site.

Response: When residual contamination is left on-site, EPA is obligated to evaluate the Site at least once every five years. Furthermore, EPA's Proposed Plan includes ongoing monitoring of Site groundwater. Where possible, EPA seeks to have responsible parties, the responsible party in this case, G.M., assume the financial responsibility for the ongoing monitoring under EPA's direction.

H. OTHER CONCERNS

Comment: One citizen asked whether G.M. continues to use PCBs at the G.M. Central Foundry facility.

Response: G.M. discontinued the use of PCBs in 1980, however, underground pipes and drains continue to contain residual PCBs from the years when G.M. used PCBs as a component of the hydraulic fluids used in the diecasting machines.

IV. COMPREHENSIVE SUMMARY OF MAJOR LEGAL AND TECHNICAL COMMENTS AND EPA'S RESPONSES TO THESE COMMENTS

GENERAL MOTORS CORPORATION

Cleanup Level

Comment: EPA has taken the unwarranted step in its Proposed Plan of establishing a single numerical concentration threshold for all soils and sediments -- 500 ppm PCBs -- as the dividing line for use of incineration rather than bioremediation. All materials with less than 500 ppm PCBs would receive biological treatment (or some other treatment such as chemical extraction or thermal destruction if biological treatment is ineffective). All material over 500 ppm would be incinerated on-site.

Response: EPA's original decision to establish a numerical threshold for use of incineration was not unprecedented and was based on the fact that data in the FS indicated that biological treatment would not be effective for material with PCB concentrations above 500 ppm and on Superfund and TSCA policy. However, where permitted by law and by newly issued guidance, in an effort to reduce the use of incineration at the Site, EPA, in its selected remedy, has not specified a threshold concentration which will mandate the use of incineration.

EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies, which will be tested concurrently with biological treatment, may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

Comment: The effectiveness of biotreatment is continually being improved. In light of this continuing progress, it is arbitrary to forbid biotreatment from being tested and used on materials containing more than 500 ppm PCBs.

Response: EPA's original decision to establish a numerical threshold for use of incineration was not unprecedented and was

based on the fact that initial data in the FS indicated biological treatment would not be effective for material with PCB concentrations above 500 ppm and on Superfund and TSCA policy. However, in an effort to reduce the use of incineration at the Site, EPA, in its selected remedy, has not specified a threshold concentration which will mandate the use of incineration.

EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies which will be tested concurrently with biological treatment may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

Comment: EPA's Proposed Plan imposes too stringent dredging/ excavation and treatment requirements.

Response: The cleanup levels and treatment levels specified in the ROD were selected by EPA to ensure protection of human health and the environment. EPA has indicated in the ROD those areas where specified cleanup levels or treatment levels may not be attainable. EPA has based its judgement of attainability on its limited experience at other sites. Actual data on the attainability of any of the cleanup or treatment levels specified in the ROD will only be obtained during implementation of the remedial action. Thus, any judgement of the severity or attainability of EPA's cleanup levels is premature and arbitrary.

Comment: G.M. believes that the cleanup criteria proposed in EPA's Proposed Plan are inappropriate, since the PCBs in soils at the Site do not present a significant current or future threat to human health or the environment. G.M. believes the health risk of the PCBs at the Site has been overstated, since the opportunities for exposure to the PCBs at the Site are extremely limited.

Response: Based on the results of the RI and its risk assessment, EPA has determined that the Site poses a current unacceptable risk to human health and the environment. PCBs which reside in river system sediments have begun to accumulate in the food chain and have been found in wildlife at the Site. Further, a large volume of soil is contaminated with PCBs at levels up to three orders of magnitude above EPA recommended action levels for industrial areas and four orders of magnitude above EPA recommended levels for residential areas. G.M.'s own risk assessment shows that current excess cancer risks to G.M. workers are outside the EPA acceptable risk range. Finally, although some opportunities for exposure to PCBs at the Site are currently limited, EPA is required to evaluate the reasonable maximum exposure to PCBs presented by the Site. In so doing, EPA has found that there are considerable opportunities for exposure to Site PCBs.

Public Participation

Comment: G.M. requests that all their comments, including attachments, appendices, and other accompanying documents, be fully considered and placed in the Administrative Record for the Site.

Response: By law, EPA must comply with this request. All comments, attachments, appendices, and other accompanying documents received during the public comment period will be placed in the Administrative Record subsequent to the signing of the ROD.

Comment: Strong local opposition to incineration has developed within communities near the Site and in Canada.

Response: Comments received during the public comment period indicate that the community has varying opinions regarding the proposed remediation of the Site. Many citizens expressed a desire for the complete removal and treatment of contamination at the Site. Other citizens expressed concern that adequate health and safety precautions be implemented, particularly in relationship to the incineration component of the remedy. EPA did receive comments which expressed complete opposition to incineration.

EPA has reduced the use of incineration in its selected remedy. EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies which will be tested concurrently with biological treatment may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

Comment: Local opposition to incineration may result in additional delays in the implementation of this remedy.

Response: Although EPA has received comments from some U.S. citizens, Canadian citizens, and environmental groups expressing concern and requesting assurances that appropriate safeguards be utilized in implementing the incineration component of the remedy, EPA has received only limited opposition to incineration as a component of the selected remedy. To the contrary, numerous commentors have expressed a preference for the permanence of incineration as a component of the selected remedy as long as stringent controls are implemented.

EPA has reduced the use of incineration in its selected remedy. EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain

area of the Site, other treatment technologies which will be tested concurrently with biological treatment may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

Remedial Investigation/Feasibility Study

Comment: Mercury, lead, nickel, cadmium and magnesium have been observed above background levels in some lagoon soils and sludges on the Site. Limited samples taken from the Industrial Landfill showed elevated (above background) levels of aluminum, arsenic, cobalt, copper, chromium, iron, nickel and zinc. Furthermore, limited samples of St. Lawrence River sediments displayed levels of some heavy metals above background for New York State soils. Emissions of heavy metals during incineration of these materials would also be a concern.

Response: EPA agrees that heavy metals will be a concern if incineration of Industrial Lagoons sludges is required. However, at this time, EPA has no reason to believe that incineration of lagoon sludges would be prohibited due to the presence of heavy metals.

Heavy metals emissions can be controlled through proper incinerator design and control. In addition, if concentration of metals in incinerator ash causes incinerator ash to be hazardous, the ash will be further treated before being disposed in a hazardous waste facility.

Comment: Site-specific characteristics, which largely determine environmental and health risks, have not been adequately identified.

Response: EPA disagrees with this comment. EPA believes the areas of the Site that are being addressed in the Operable Unit I ROD have been adequately characterized in the RI/FS and the risk assessment that was conducted by Gradient Corporation. While EPA has grouped various areas of the Site together in the Proposed Plan and ROD for ease of explanation, EPA thoroughly evaluated each area of the Site to determine environmental and health risks and to develop an appropriate remediation plan.

Comment: The FS findings determined that based on substantial differences between Site areas, different remedial approaches should be employed. EPA's plan does not distinguish between areas.

Response: As indicated in the FS, EPA fully recognizes the substantial differences between Site areas. EPA has further factored these site-specific characteristics into the remedy selection process as required by the NCP.

Proposed Plan

Comment: EPA must consider the sheer size of the Site, the restricted access of the Site, its impermeable soils, and the demonstrated characteristics of PCBs, in determining the appropriate remedy for the Site. The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) also requires EPA to consider costs. Both the proposed 10 ppm cleanup standard for PCBs in soils and the associated treatment requirements do not have any basis in science or policy.

Response: EPA has considered the size of the Site, its current restricted access, its fairly impermeable soils, and the characteristics of PCBs in developing its selected remedy. After careful consideration of the site-specific characteristics, EPA evaluated and balanced each of the proposed remedial alternatives according to the nine criteria defined in the NCP. EPA then balanced the nine criteria to determine the appropriate remedies for cleaning up contaminated soils and sludges.

EPA has selected a soil/sludge PCB cleanup level of 10 ppm on the G.M. facility. This level is based, in part, on EPA's risk assessment for the alternatives considered for the Site which indicates that 10 ppm is protective of the Indian population and, in part, on EPA guidance which recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to remediated areas will be unlimited to G.M. personnel and because contaminants in on-site soils may impact groundwater and surface water quality. EPA has selected a soil/sludge total phenols cleanup level of 50 ppm based on federal RCRA guidance for closure of surface impoundments. EPA estimates that there are 176,000 cubic yards of soils and sludges in the Industrial Lagoons, in the North Disposal Area, and in other areas on the G.M. facility contaminated with PCBs above 10 ppm which are being addressed in this operable unit.

EPA has also decided to contour the East Disposal Area to prevent surface runoff to the St. Regis Mohawk Reservation and to minimize movement of contaminated surface soils. A final remedy for the East Disposal Area will be addressed with the Industrial Landfill in the second operable unit ROD.

Comment: EPA's Proposed Plan does not discuss the fact that no other Superfund site has involved such large volumes of soil containing PCBs at low concentrations. This indicates that site-specific balancing of the remedy selection criteria has not occurred.

Response: EPA's Proposed Plan is not meant to be a comprehensive document which describes every aspect of EPA's decision-making with regard to the Site. Rather, the Proposed Plan is intended to be

a summary of EPA's proposal for Site remediation written to solicit community input into the Superfund decision-making process.

EPA has balanced site-specific factors into its decision-making for the G.M. Site as documented in the ROD. Further, the draft FS for the Site indicates that there are approximately 565,000 cubic yards of material on the Site with PCB concentrations above 50 ppm. This is evidence of a large volume of soil with substantial PCB concentrations at the Site.

Comment: The NCP requires that the decision-maker compare the incremental cost differences of the alternatives being considered to their incremental differences in effectiveness. Cost must be proportional to overall effectiveness. EPA's proposed remedy for the Site reflects a failure to adequately balance these criteria.

Response: EPA has complied with the NCP's requirements for cost-effectiveness as explained in the "Statutory Determinations" section of the ROD. The NCP does not require an incremental demonstration of cost-effectiveness. The only reference in the NCP which remotely resembles the position of the commentor is located at 55 Fed. Reg. 8729 (March 8, 1990), wherein EPA agrees with a commentor's statement that "a cost-effective remedy is one with cost proportional to the remedy's overall effectiveness.

Comment: The FS analysis for the Site supports the selection of a remedy that is more protective and significantly less costly than the one proposed by EPA. G.M.'s recommendation, based on the FS, would tailor the use of treatment and containment methods to the specific characteristics of the areas on the Site where soil, debris and sediments containing PCBs have been found. G.M. believes that EPA did not properly balance the CERCLA remedy selection criteria when it proposed incineration and biotreatment to extremely low levels as the remedial measures for the entire Site.

Response: G.M.'s interpretation of the FS analysis and the remedy put forth by G.M discount the CERCLA preference for treatment expressed at Section 121(b)(1). EPA's selected remedy was derived through a site-specific balancing of the nine evaluation criteria described in the NCP. EPA has met the CERCLA preference for treatment at the Site where possible, and has tailored its remedy and cleanup goals to the various areas of the Site, as necessary.

Comment: EPA's proposed use of incineration also presents substantial uncertainties, costs, and implementation issues not presented by other technologies. Key areas of concern with the use of incinerators in general include air emissions and other environmental hazards and operational difficulties. Given the restricted access of the Site, the relative immobility of PCBs, the lack of evidence that Aroclor 1248 or 1232 is harmful, and the ease of effectively isolating PCBs at most of the Site areas from human

and wildlife exposure through less hazardous and more cost-effective measures, there is no reason to incur the costs and uncertainties of incineration on the scale mandated by EPA.

Response: EPA disagrees with several of the premises of this comment. First, of the six technologies evaluated in detail in the draft FS, only incineration is a technology which has been in use commercially for many years. In fact, of the six technologies presented, all but incineration are characterized by EPA as innovative technologies. Biological treatment is the most innovative technology considered since it has not been proven at full-scale. In addition, while the other five technologies require some degree of treatability testing to determine effectiveness in treating PCBs, data on the effectiveness, cost, and implementation of incineration are readily available from vendors and other Superfund sites. Several of the technologies considered present air emissions concerns and greater operational difficulties than incineration.

Second, the RI/FS does not support the theory that the Site is inaccessible. Since the Site is an operating facility and areas of the Site, including those areas on the St. Regis Mohawk Reservation are not fenced, access continues to be a concern. Third, although the literature indicates differences of opinion on the potential impact of various Aroclors, EPA has used existing guidance (which is supported by much of the current literature) to characterize risks from PCBs at the Site.

Finally, although containment of contamination is less difficult than excavation or dredging and treatment of contamination, EPA is bound by CERCLA to prefer technologies in which treatment that permanently and significantly reduces the volume, toxicity or mobility of the PCBs is a principal element.

Comment: Unburned hydrocarbons, PICs, and heavy metals may also ultimately end up in the fly ash and bottom ash resulting from incineration. Heavy metals in the ash will likely exhibit greater leachability than in the original soil feed, thereby potentially requiring additional treatment such as solidification or stabilization. EPA has not evaluated the costs for additional management of hazardous ash in the Proposed Plan.

Response: EPA agrees with this comment. The draft FS, as submitted by G.M., assumes that fly and bottom ash from the incineration process is non-hazardous. If incineration is required at the Site and all or part of the incinerator ash is tested and found to be hazardous, EPA will either treat the ash further to render it non-hazardous or dispose of the ash in compliance with hazardous waste requirements.

Comment: Incineration poses additional environmental hazards including fires, explosions, fuel spills and other catastrophic events.

Response: Each remedial alternative evaluated in the FS has unique advantages, disadvantages, and potential impacts. Each remedial alternative also exhibits unique degrees of effectiveness to remediate specific wastes. While EPA recognizes the disadvantages associated with incineration, the Agency has concluded, based on the current commercial use of incineration, that this potential is negligible. Incineration has been demonstrated to be an effective alternative for remediating PCBs in soils and sludges. This technology has been effectively used at numerous Superfund sites and federal projects.

Comment: The characteristics of the materials on particular areas of the Site will make incineration of many of those materials exceptionally difficult and potentially impossible to implement.

Response: EPA recognizes that bulk materials present in the North Disposal Area or in sediment may not be amenable to incineration or any other type of treatment. EPA, as part of the remedy selected in the ROD, will remove bulk items which cannot be treated and dispose of them in a TSCA compliant landfill on-site.

EPA has reduced the use of incineration in its selected remedy. EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies which will be tested concurrently with biological treatment may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

However, EPA believes that PCB-contaminated soils can be effectively remediated through a combination of biological treatment and incineration. At other Superfund sites with PCB-contaminated soil and sludges, incineration has been demonstrated to be a very effective remedial alternative.

Comment: The types of materials present in the East Disposal Area and the Industrial Landfill make excavation and incineration of the contents of those areas practically and technically not achievable.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA

will consider this comment when developing a Proposed Plan for the East Disposal Area and Industrial Landfill.

Comment: At several Superfund sites involving PCBs, EPA has selected remedial alternatives other than incineration as a remedy because of one or more of the above problems. Such sites include the Sullivan's Ledge site in Massachusetts, the Wide Beach Development and York Oil sites in New York, the Kane & Lombard site in Maryland, the Chemical Control site in New Jersey, the Pepper's Steel and Alloy site in Florida, the Envirochem/Northside Sanitary Landfill, Sheridan Disposal Services and Midco sites in Indiana, the Sol Lynn and French Limited sites in Texas, the Commencement Bay Nearshore Tidal Flats, Western Processing, and Queens City Farms sites in Washington, the Pacific Hide and Fur site in Idaho, and the M.G.M. Brakes site in California.

Response: The cleanup technologies selected by EPA in the ROD are consistent with those selected for other Superfund sites with similar characteristics. EPA has reduced the use of incineration in its selected remedy. EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies which will be tested concurrently with biological treatment may be employed. In the event that other technologies are ineffective, incineration will be used at the Site. During treatability testing, EPA will evaluate several of the technologies selected for the sites referenced by G.M.

Comment: EPA's approach to remediation of the Site appears to be the desire to achieve "permanence." Under CERCLA and existing EPA policy, however, the desire for "permanence" does not alone justify selection of an extreme and costly treatment remedy.

The NCP requires that the Agency compare the cost differences of alternatives being considered, to the differences in effectiveness of the alternatives (Fed. Reg. 8728-29, March, 1990). EPA's Proposed Plan for the Site provides for an extremely costly and impracticable remedy.

Response: EPA has balanced all of the remedial alternatives evaluated according to the nine criteria defined in the NCP (300.430 (e)(a)(iii);300.430(f)(i)(i)), including balancing the incremental cost differences with the differences in effectiveness prior to selecting the remedies outlined in the ROD. The selected remedy is cost-effective because it has been demonstrated to provide overall effectiveness proportional to its costs.

Comment: Both EPA and NYSDEC have recognized that, in some instances (i.e., large landfills) "permanent" remedies are not appropriate. If permanence was the sole criterion for remedy

selection, the FS could be limited to a survey of destruction technologies and a treatability analysis. No significant balancing of alternatives under EPA's "balancing criteria" would be needed. CERCLA, the NCP, and a variety of EPA guidance documents relevant to the preparation of FSs, however, explicitly call for multiple alternatives involving various degrees of treatment to be arrayed and analyzed. Under the specific circumstances of the Site, a remedy can be selected that incorporates a variety of different technologies to provide protectiveness and long-term effectiveness at a cost which is proportional to the risks being addressed. When the potential problems with incineration are put in the context of the Superfund remedy selection criteria, they show that EPA's proposed incineration remedy scores poorly with respect to short-term effectiveness, implementability, and cost.

Response: While G.M.'s description of EPA's regulations and policy regarding analysis of a range of alternatives is essentially correct, it's conclusions regarding the use of incineration are not warranted. The draft FS for the Site does indeed incorporate containment alternatives, in accordance with the NCP. However, when the long-term effectiveness and permanence of incineration of other, less expensive treatment technologies are weighed against that of containment, treatment of the highly persistent PCBs at the Site is warranted. EPA does not agree that implementation of incineration poses great difficulty. In fact, as stated in the draft G.M. FS, incineration can be implemented using proven equipment and technologies.

Comment: The individual characteristics of the areas on the Site are not reflected in EPA's Proposed Plan. National EPA policy provides that the use of treatment should account realistically for the character of the waste materials, the size of the Site, and similar considerations.

Response: After careful consideration of G.M.'s site-specific characteristics, EPA evaluated and balanced each of the proposed remedial alternatives according to the nine criteria defined in the NCP. EPA balanced the nine criteria to determine the appropriate remedies for cleaning up the Site.

EPA's Proposed Plan is not meant to be a comprehensive document which describes every aspect of EPA's decision-making with regard to the Site. Rather, the Proposed Plan is intended to be a summary of EPA's proposal for site remediation written to solicit community input into the Superfund decision-making process.

Comment: In OSWER Directive No. 9355.0-26, "Advancing the Use of Treatment Technologies for Superfund Remedies" (Feb. 21, 1989), and in the NCP, EPA specifically stated that treatment technologies are most appropriate for wastes that cannot be reliably controlled through containment, such as liquids, highly mobile materials such as solvents, and high concentrations of toxic compounds. PCBs in

soil are not mobile, nor are they highly toxic. EPA's proposal to incinerate all soils containing PCBs over 500 ppm and to bioremediate all soils containing less than 500 ppm is unwarranted and arbitrary.

Response: Based on the results of the RI and the Risk Assessment, EPA has determined that a large volume of soil is contaminated with PCBs at levels significantly above EPA recommended action levels. EPA has selected a soil/sludge PCB cleanup level of 10 ppm on the G.M. facility. This level is based, in part, on EPA's risk assessment for the alternatives considered for the Site which indicates that 10 ppm is protective of the Indian population and, in part, on EPA guidance which recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to remediated areas will be unlimited to G.M. personnel and because contaminants in on-site soils may impact groundwater and surface water quality. EPA has selected a soil/sludge total phenols cleanup level of 50 ppm based on federal RCRA guidance for closure of surface impoundments. EPA estimates that there are 176,000 cubic yards of soils and sludges in the Industrial Lagoons, in the North Disposal Area, and in other areas on the G.M. facility contaminated with PCBs above 10 ppm which are being addressed in this operable unit.

EPA has reduced the use of incineration in its selected remedy. EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies, which will be tested concurrently with biological treatment, may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

Comment: G.M. agrees with EPA's Proposed Plan to excavate soils and treat them on the Site. However, G.M. strongly disagrees with the cleanup level of 10 ppm PCBs proposed for this area in EPA's plan because these materials pose minimal risk to human health and the environment, and treatment of such materials to that level results in very high costs.

Response: Based on the results of the RI and the Risk Assessment, EPA has determined that a large volume of soil is contaminated with PCBs at levels significantly above EPA recommended action levels. EPA has selected a soil/sludge PCB cleanup level of 10 ppm on the G.M. facility. This level is based, in part, on EPA's risk assessment for the alternatives considered for the Site which indicates that 10 ppm is protective of the Indian population and, in part, on EPA guidance which recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to

remediated areas will be unlimited to G.M. personnel and because contaminants in on-site soils may impact groundwater and surface water quality. EPA has selected a soil/sludge total phenols cleanup level of 50 ppm based on federal RCRA guidance for closure of surface impoundments. EPA estimates that there are 176,000 cubic yards of soils and sludges in the Industrial Lagoons, in the North Disposal Area, and in other areas on the G.M. facility contaminated with PCBs above 10 ppm which are being addressed in this operable unit.

Comment: EPA should allow for the use of innovative technologies including bioremediation for soils and debris above 500 ppm PCBs. Consistent with the Draft PCB Guidance, no treatment should be mandated for soils and sediments containing less than 500 ppm, although treatment should be allowed.

Response: EPA has reduced the use of incineration in its selected remedy. EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies, which will be tested concurrently with biological treatment, may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

The final Guidance on Remedial Actions for Superfund Sites with PCB Contamination, OSWER Directive 9355.4-01, does recommend treatment of soil in industrial areas with PCB concentrations above 500 ppm. However, EPA has evaluated the nature of soil contamination in the North Disposal Area and has determined that segregation of material with PCB concentrations above 500 ppm would be difficult and would result in small volumes of soil to be contained. For this reason, EPA has opted to treat, as a whole, contaminated soil in the North Disposal Area.

Comment: EPA should allow for the simultaneous evaluation of several innovative technologies to determine what methods provide cost-effective and efficient remediation for soils both above and below 500 ppm. Biological treatment and incineration should not be mandated as the only treatment technologies to be used without an evaluation of alternatives.

Response: EPA has reduced the use of incineration in its selected remedy. EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies which will be tested concurrently with biological treatment may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

Comment: EPA's proposed remedy for the East Disposal Area presents significant health risks and a high likelihood of failure due to practical problems with implementation of the incineration remedy.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

Comment: EPA failed to consider the off-site disposal of incineration residues which, if hazardous, would push the approximately $54 million of this alternative even higher.

Response: The ROD explains EPA's consideration of the disposal of incineration residues. The draft FS, as submitted by G.M., assumes that fly and bottom ash from the incineration process is non-hazardous. If incineration is required at the Site and all or part of the incinerator ash is tested and found to be hazardous, EPA will either treat the ash further to render it non-hazardous or dispose of the ash in compliance with hazardous waste requirements.

Comment: EPA's plan does not distinguish between active and inactive waste water treatment lagoons on the Site. Any remedial actions regarding the active lagoons must recognize the fundamental importance of these units to the ongoing operations of the plant. The company agrees with EPA's plan regarding the inactive lagoons, subject to the general objections concerning cleanup levels and limitations on applicable technologies.

The active lagoons are part of the recirculating water system at the G.M. plant. This system is vital to the plant's continued operation. The active lagoons provide cooling water to the plant and process water required in the lost foam casting process. The active lagoons at the G.M. facility contain PCBs at relatively low concentrations which migrate slowly. EPA should reconsider the proposed remediation alternative for the active lagoons.

Response: In response to this comment, EPA's selected remedy delays cleanup of the active lagoons until they are taken out of service by G.M. The active lagoons will be remediated in the same manner as the inactive lagoons when they are taken out of service. In the interim, any groundwater releases from the active lagoons will be treated subsequent to recovery, as specified in the first operable unit ROD.

Comment: EPA's Proposed Plan to require the dredging and treatment of sediments from the St. Lawrence River is unlikely to be

effective. EPA's proposal is likely to result in unnecessary public health and environmental risk resulting from the resuspension of sediments containing PCBs in the river's water column. Sediments containing PCBs suspended during dredging which are not captured by silt control devices will simply be redeposited downstream.

Response: EPA recognizes that there may be some difficulties associated with resuspension of contaminants during dredging. However, dredging has been used effectively at another Superfund site in New Harbor, Massachusetts to remove PCB-contaminated sediments from an estuary.

There are several factors which EPA believes will contribute to the effectiveness of dredging as a means of removing sediment from the St. Lawrence River. First, the area to be dredged is fairly shallow and is located adjacent to the shore of the St. Lawrence River. Second, the use of engineering controls such as sheet pile walls has been shown to substantially reduce sediment resuspension. Third, the selection of the dredging technique can be made with the goal of minimizing sediment resuspension. Fourth, the public health and environmental impacts resulting from sediment dredging (which is of relatively short duration) are likely to be lower than the current risks posed by the contaminated sediment. Finally, in the event that monitoring indicates that there are any downstream depositional areas which collect resuspended sediments, they can be dredged to remove those resuspended sediments. The iterative process of sampling, excavating and re-sampling is contemplated as an integral part the remedial action.

Comment: EPA's plan to require dredging and treatment of river sediments to a cleanup level of 2.0 ppm is not likely to be achievable using available dredging technology. Such technology has a limited effective removal rate, even with multiple passes with dredging equipment. Sediments resuspended in the water column during dredging which are not transported downstream will eventually settle back down onto underlying sediments. Because of dredging inefficiency and inevitable resuspension problems, EPA's cleanup level of 2.0 ppm is likely to be not achievable.

Response: In response to comments, EPA has modified its cleanup level for the St. Lawrence and Raquette River to 1 ppm PCBs. The 1 ppm PCB cleanup in the St. Lawrence and Raquette Rivers was based on interim federal and State sediment quality criteria guidance as well as on EPA's risk assessment. Application of interim federal sediment quality criteria guidance indicates that a PCB cleanup level in sediments should be between 0.08 and 2 ppm. State sediment quality criteria guidance indicates that PCB cleanup levels well below 1 ppm are required to achieve protection of the environment. EPA's risk assessment for the Site demonstrates that a 1 ppm PCB cleanup level in sediment corresponds to a 4 x 10^{-5} excess cancer risk.

Therefore, in an attempt to minimize residual risks, EPA has selected 1 ppm as a cleanup goal in the St. Lawrence and Raquette Rivers. In selecting the 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers, EPA has also balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers is achievable and provides an acceptable measure of protection to human health. The 0.1 ppm cleanup goal for Turtle Creek selected by EPA is based on Tribal requirements. This level may not be achievable in all areas due to the technical limitations of dredging as a means of removing sediment.

Comment: G.M. believes that EPA should come to a prompt determination that the Industrial Landfill should be closed in place, with enhancement of the existing cap and implementation of additional ground water recovery and treatment systems.

Excavation of the landfill is estimated to result in substantially increased potential risk to human health and the environment. Since the landfill exhibits lower overall PCB concentrations in much greater volumes of soil than other areas on the Site, the cost of excavation is grossly disproportionate to the protection to be achieved.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

Comment: The landfill is filled with large bulk debris that would render treatment of much of the material technically infeasible.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

Comment: EPA's Proposed Plan makes no attempt to analyze and balance the CERCLA criteria in light of the site-specific circumstances detailed in the FS. Because EPA's proposed plan for the Site is essentially generic -- it could be applied to virtually

any PCB site in the nation -- the plan does not adequately satisfy CERCLA or the NCP.

Response: EPA disagrees with this comment. EPA, based on site-specific characteristics, has evaluated each remedial alternative against the nine criteria set forth in the NCP and in full accord with the guidance for selection of cleanup remedies for PCB-contaminated sites.

Comment: The cutoff for regulation of PCBs under TSCA is 50 ppm. Under Superfund guidance concerning the applicability of RCRA land disposal restrictions to soil and debris, the threshold concentration for treatment of materials containing PCBs is 100 ppm. (Superfund LDR Guide #6A, OSWER Directive No. 9347.306FS, July 1989). Proper management of soils and debris containing more than 50 ppm PCBs would be fully protective of human health and the environment. No remediation of on-site soil PCB concentrations under 50 ppm is necessary.

Response: EPA's selected remedy is consistent with applicable or relevant and appropriate requirements (ARARs) and other policies which warranted consideration at the Site. The RCRA land disposal restrictions are not ARARs for this operable unit ROD due to the fact that RCRA wastes were not found in any of the areas of the Site addressed in this operable unit. EPA's cleanup levels are selected after considering its risk assessment, policies, and ARARs.

EPA has selected the 10 ppm cleanup level for PCB-contaminated soils at the G.M. facility based in part on EPA's risk assessment for the alternatives considered for the Site. The risk assessment, which was conducted according to all appropriate EPA methods and protocols, indicated that 10 ppm is protective of the Indian population. In addition, this level meets EPA recommended PCB soil action levels for industrial facilities, which were based, in part, on risk to site workers. In general, EPA recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to the remediated areas will be unlimited and because on-site soils impact surface and ground water quality. The 10 ppm PCB cleanup level is consistent with PCB cleanup levels selected for industrial areas at other Superfund sites.

Comment: EPA's cleanup criteria for river sediments are also too stringent, in light of the characteristics of PCBs and the limitations of current dredging technologies.

Response: It is impossible to determine, with any accuracy, the efficiency of dredging in removing contaminated sediments. EPA's selected remedy acknowledges that the 1 ppm cleanup level selected for St. Lawrence and Raquette River sediments is an attempt to minimize residual risks. In selecting the 1 ppm cleanup goal in

the St. Lawrence and Raquette Rivers, EPA has also balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers is achievable and provides an acceptable measure of protection to human health.

The 0.1 ppm PCB cleanup goal for Turtle Creek selected by EPA is based on Tribal regulations. This level may not be achievable in all areas due to the technical limitations of dredging as a means of removing sediment.

Comment: G.M. questions EPA's rationale and technical support for recommending dredging, rather than simply capping the St. Lawrence River sediments, if capping will still be required after dredging is completed.

Response: EPA has determined that dredging is an effective way of removing the volume of contaminated sediments in the river system based on limited previous experience at other Superfund sites and federal projects. In addition, dredging of sediments is a permanent remedy which allows treatment to reduce toxicity, mobility, and volume of PCBs.

In addition, although sediment containment with a graded cover would reduce the erosive force of the flowing river water and would limit movement of contaminants into the environment, its long-term effectiveness is dependent upon the adequacy and reliability of the sediment cover. Long-term monitoring and maintenance of contained sediments which would be required would be difficult to achieve because the cover is located underwater. Little information is available on the frequency of maintenance or on the probability of cover failure. If the sediment cover fails, risks on the order of 10^{-2} would be present immediately. Sediment dredging permanently removes the risks from contaminated sediments.

Comment: EPA's ground water cleanup criterion of 0.1 ppb is unwarranted and infeasible, given the nature of ground water underneath the Site and the adsorptive characteristics of PCBs. Even if soils on the Site are treated to 10 ppm PCBs as proposed by EPA, it is improbable that an 0.1 ppb aquifer cleanup criterion could be achieved in the foreseeable future.

Response: During recovery and treatment, EPA's cleanup goal is the New York State PCB ARAR of 0.1 ppb PCBs. Based on EPA studies of other sites, EPA has found that the final groundwater cleanup level will depend on technical considerations such as the propensity of PCBs to sorb to soil. If during implementation of the remedy the groundwater cleanup goal of 0.1 ppb PCBs proves impossible to achieve, EPA will consider modifying the groundwater recovery and treatment portion of the selected remedy.

Risk Assessment

Comment: Several recent surveys of the scientific literature have shown that no reasonable medical or scientific basis exists for concluding that acute or chronic exposure to PCBs found at the Site could cause cancer, liver disease, or any one of a number of other alleged human health effects rumored to result from PCB exposure.

Response: While congener specific analyses might be the best approach for determining the risks from the types of PCBs found at the G.M. Site, it is expensive and difficult to obtain such analyses at this time. There is also a great deal of uncertainty surrounding the toxicology of all the possible congeners from the mixtures of concern at this Site. In view of all these difficulties, EPA is compelled to use a protective approach in assessing risk to PCBs.

Comment: The risk assessment inappropriately assumes that all PCBs are potentially carcinogenic and have similar potency factors, based on studies of Aroclor 1260.

Response: This is the customary practice based on the uncertainties in the toxicological literature and uncertainties involved in using an Aroclor rather than a congener specific approach.

Comment: As described in the Gradient risk assessments, any treatment technologies that cannot be used in-situ will result in the release of PCBs into the air from excavation, soil handling and dust emissions prior to treatment. EPA's Proposed Plan completely fails to consider the risk associated with the excavation and treatment of these materials.

The Gradient risk assessment utilized several problematic assumptions in connection with its estimate of potential excess lifetime cancer risk resulting from excavating this area that tended to bias the result in favor of EPA's proposal. For example, Gradient assumed that the exposed area during excavation of the East Disposal Area would correspond to the daily volume needed for incineration and biotreatment assuming an excavation depth of one meter. This does not take into account the practical difficulties with implementing excavation (the need for space to stage and move equipment, separate debris, move trucks, etc.), all of which tend to increase the amount of soils containing PCBs that are exposed to the air during implementation. As the amount of exposed soil increases, PCB volatilization rate and potential exposures increase.

Response: Gradient did not fail to consider risk associated with excavation and treatment. In particular, Gradient used a conservative approach in estimating risks from dioxin and furans generated during incineration. It is not unreasonable to assume that the exposed area during excavation of the East Disposal Area

would correspond to the daily volume needed for incineration and biotreatment. The need for space to stage and move equipment, separate debris and move trucks will necessarily increase the amount of soils containing PCBs which are exposed to air. Volatilization from exposed soils can be limited by implementing engineering controls during construction if this transport mechanism appears to be of concern.

EPA's Proposed Plan is not meant to be a comprehensive document which describes every aspect of EPA's decision-making with regard to the Site. Rather, the Proposed Plan is intended to be a summary of EPA's proposal for Site remediation written to solicit community input into the Superfund decision-making process.

Comment: Because of the large percentage of bulk debris present in the East Disposal Area, EPA's proposed excavation and treatment remedy presents a high likelihood of failure due to practical problems with implementation of the remedy.

EPA did not consider in its Proposed Plan the increased health risks and costs attendant to excavation, transportation and disposal of these untreatable materials.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

Comment: Gradient's approach to modeling releases during dredging operations contains a number of optimistic assumptions which demonstrate that Gradient's risk assessment underestimates the potential releases and risks associated with dredging. Gradient's approach assumes an idealized efficiency for suspended sediment control, lower releases of suspended sediments to the river, and a shorter dredging time than are supportable. These assumptions combine to underestimate the potential lifetime cancer risks associated with dredging.

Response: Gradient made many conservative (protective) assumptions however, to compensate for uncertainty. They assumed, for example, a dredging period of 172 days even though the actual dredging is likely to be shorter. Additionally, the intrinsic conservatism of toxicological parameters ensures that the action will be protective of human health and environment.

Comment: According to the Gradient risk assessment, a cap over the remaining sediments is likely to be required even after dredging because of the inefficiency of dredging as a remedial technology.

The risk assessment completely failed to evaluate the levels of risk reduction and residual risk that would be provided by a sediment capping alternative which did not involve dredging.

Response: The Gradient risk assessment evaluated three possible dredging scenarios - the use of dredging alone (with no release of resuspended sediments), the use of dredging followed by sediment resuspension, and the use of dredging to remove sediments followed by capping of resuspended residuals. These options were evaluated to estimate the bounds of the risk posed by dredging. The true risk from dredging may lie somewhere between these extremes. The level of residual risk associated with sediment capping is likely to be similar to the level associated with dredging followed by sediment capping. However, dredging would permanently address the area of Site contamination which poses a principal threat to human health and the environment.

Comment: EPA's proposal fails to adequately consider the risk created by the resuspension of sediments containing PCBs resulting from dredging, and the possibility that such sediments will be redeposited downstream.

This is likely to result in increased short-term and possibly long-term exposure of fish, wildlife, and consumers of fish to PCBs.

Response: The Gradient risk assessment evaluated three possible dredging scenarios - the use of dredging alone (with no release of resuspended sediments), the use of dredging followed by sediment resuspension, and the use of dredging to remove sediments followed by capping of resuspended residuals. These options were evaluated to estimate the bounds of the risk posed by dredging.

Comment: EPA's risk assessment of Site sediments inflated estimated risks because of erroneous assumptions concerning the levels of human exposure to PCBs in water and fish. The assessment also failed to account for background levels of PCBs from upstream sources. Consequently, a stringent sediment cleanup level would have no discernible effect on ambient levels of PCBs in the St. Lawrence River.

Response: There were several uncertainties in EPA's risk assessment. Due to time and financial constraints, data on the eating, hunting, and fishing habits of the Reservation population was based on a case study using an unstructured interview questionnaire of key informants rather than on a large-scale random sample statistical survey of the entire Reservation population. Data on fish and wildlife PCB concentrations were limited and were restricted to fish from waters near the Reservation. Historical data on surface water contamination in the St. Lawrence River were used despite the fact that more recent data from the Reservation did not indicate PCB contamination.

Despite these uncertainties, however, based on the RI and the Risk Assessment, EPA has determined that as a result of past operating practices, G.M. has released PCBs to the St. Lawrence river system. RI data show that PCB levels in sediment are higher in the area adjacent to the G.M. outfall. Therefore, EPA believes that cleanup of the area of sediment contamination adjacent to the G.M. outfall will mitigate effects of PCBs on wildlife and reduce the bioaccumulation of PCBs in the food chain near the Site.

EPA also recognizes that PCBs are likely entering the St. Lawrence River from non-site sources contributing to PCB levels in sediments and surface water. In order to maximize the effectiveness of the remediation, EPA will attempt to coordinate the cleanup effort in the St. Lawrence River with the cleanup of other potential source areas associated with ALCOA and Reynolds facilities.

Comment: Because of the characteristics of PCBs and the specific characteristics of the Site, the potential risks posed by the Site do not warrant the excessively low cleanup criteria proposed in EPA's Proposed Plan. Access to the Site is restricted and it will remain so in the future. PCBs in soil and debris are relatively immobile and the Aroclors present at the Site pose much less risk than EPA has presumed.

Response: EPA has selected the 10 ppm cleanup level for PCB contaminated soils at the G.M. facility based in part on EPA's risk assessment for the alternatives considered for the Site. The risk assessment, which was conducted according to all appropriate EPA methods and protocols, indicated that 10 ppm is protective of the Indian population. In addition, this level meets EPA recommended PCB soil action levels for industrial facilities, which were based, in part, on risk to Site workers. In general, EPA recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to the remediated areas will be unlimited and because on-site soils impact surface and ground water quality. The 10 ppm PCB cleanup level is consistent with PCB cleanup levels selected for industrial areas at other Superfund sites.

Comment: The health risks of PCBs are overstated in EPA's analysis. Substantial evidence supports distinguishing between Aroclor 1260, on which EPA bases its risk assessment protocol, and Aroclor 1248 (found on the G.M. Site) and Aroclor 1232 (found in small concentrations in the St. Lawrence River adjacent to the Site).

Response: Although the assessment of risk using congener specific analyses would be the best approach for PCBs, it is expensive and difficult to obtain such analyses at this time. There is also a great deal of uncertainty surrounding the toxicology of all the possible congeners from the mixtures of concern at this Site. In view of all these difficulties, EPA is compelled to use a

protective approach in assessing risk to PCBs which assumes that the risk from all aroclors is equivalent to that of Aroclor 1260.

Comment: There is considerable scientific evidence indicating that significant differences in toxicity and tumorigenicity exist between PCB congeners. A comparison of the recommended cancer potency factor developed by Chase et al. for Aroclor 1248 (0.4 $mg/kg/day^{-1}$), with EPA's cancer potency factor based on Aroclor 1260 (7.70 $mg/kg/day^{-1}$), shows that the Aroclor 1248 potency factor, which remains a conservative figure, is 19 times lower than the Aroclor 1260 value. The difference between the cancer potency factor should be incorporated into EPA's cleanup level.

Response: The Chase et. al. 1989 study was extensively reviewed on behalf of the Pennsylvania Department of Environmental Resources. Although Chase et al. made some valid points concerning body weight vs. surface area extrapolations and uncertainties associated with using data from the Aroclor 1260 bioassay, many more uncertainties were introduced by Chase et al. than were resolved. These pertain specifically to completeness of the toxicological data base and the impact of mechanistic assumptions on risk assessment. Finally, it was noted that the basis of toxicological surrogacy advocated by Chase et al. is not supported by chemical analytical data and appears to be based on obsolete evidence. EPA guidelines on risk assessment are based on the principle that conservative assumptions should be used to circumvent potential public health problems associated with uncertainty in risk assessment. This is the approach which was taken in the G.M. Site risk assessment.

Comment: The chances of significant current or future human exposure to PCBs located on-site at the G.M. facility are remote. With the exception of the Raquette River bank, the G.M. plant property is a restricted access area. The Site is fenced and monitored by cameras, and plant security officers are on duty 24 hours per day. The restricted nature of the Site supports a cleanup level of 50 ppm PCBs for on-site soils.

Response: EPA has selected a soil/sludge PCB cleanup level of 10 ppm on the G.M. facility. This level is based, in part, on EPA's risk assessment for the alternatives considered for the Site which indicates that 10 ppm is protective of the Indian population and, in part, on EPA guidance which recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to remediated areas will be unlimited to G.M. personnel and because contaminants in on-site soils may impact groundwater and surface water quality.

Comment: The Agency states that a 10 ppm level for PCBs in soils documented in the Proposed Plan is based on EPA's TSCA PCB spill cleanup policy and on requirements submitted by New York State. TSCA spill policy clearly shows that it provides for a cleanup

level of no less than 25 ppm PCBs at restricted access sites such as Massena. Further, to our knowledge, New York State has not promulgated a state standard for the cleanup of PCBs in soils.

Response: As explained in the ROD, EPA has selected a soil/sludge PCB cleanup level of 10 ppm on the G.M. facility. This level is based, in part, on EPA's risk assessment for the alternatives considered for the Site which indicates that 10 ppm is protective of the Indian population and, in part, on EPA guidance which recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to remediated areas will be unlimited to G.M. personnel and because contaminants in on-site soils may impact groundwater and surface water quality.

Comment: In addition to conflicting with existing EPA guidance, a cleanup level of 10 ppm PCBs is inconsistent with other RODs for sites containing PCBs and is likely to be considered arbitrary by the courts.

Response: The 10 ppm cleanup level is consistent with PCB cleanup levels selected for industrial areas at other Superfund sites.

Comment: EPA proposed a cleanup goal of 0.1 ppm PCBs for the sediments in the Raquette River and the unnamed tributary, "based on Tribal requirements." EPA's recognition in its Proposed Plan that such a standard "may be technically impracticable" in light of "previous experience at other Superfund sites and federal projects" makes it inappropriate for use as an ARAR or as a criterion "to be considered."

Response: G.M. has incorrectly interpreted CERCLA's mandates regarding ARARs, as well as EPA policy. Technical impracticability is cited as one of only six reasons which may be used to justify waiving of an ARAR (CERCLA 121(d)(4)). EPA's determination that the Tribal requirements are ARARs is based on the procedures by which the Tribal standards were developed, and their applicability to the Site as described in CERCLA 121(d)(2)(C)(iii).

Comment: There is no evidence that the standard for cleanup of sediments created by the St. Regis Mohawk Tribe is of general applicability or that it has any demonstrated basis from a human, health or environmental perspective. The language of the Tribal resolution enacting the 0.1 ppm "clean-up standard for PCBs" clearly refers to the Site. It is unlikely that the 0.1 ppm standard applies to any other PCB remedial action, or has any intended application, other than to the Site. Moreover, this ARAR may effectively preclude certain remedial actions on Tribal lands, and certainly precludes land disposal of sediments from the unnamed tributary and the Raquette River on Tribal lands. Consequently, the Tribal criterion is not an "ARAR" under the language of CERCLA and the NCP.

Response: EPA has previously addressed a similar issue to that raised by the above-quoted comment. In the preamble to the NCP, EPA stated:

> Indian commentors contended that ARARs should not be defined as promulgated laws, regulations or requirements, because some Indian tribe laws, which could apply to a Superfund cleanup, may not be promulgated in the same fashion as state or federal laws.

NCP Preamble, 55 Fed. Reg. 8742 (March 8, 1990). EPA responded to the NCP commentors as follows:

> EPA realizes that tribal methods for promulgating laws may vary, so any evaluation of Tribal ARARs will have to be made on a case-by-case basis.

55 Fed. Reg. 8742. In the case of the St. Regis Mohawks, EPA has determined that the PCB criteria established by the Tribe are "promulgated", that is, they fit within that class of criteria which "are of general applicability and are legally enforceable." 55 Fed. Reg. 8841. In addition, EPA disagrees that the criterion was promulgated solely so as to apply to the G.M. Site and notes that the ALCOA and Reynolds facilities are immediately upriver, and the York Oil Superfund Site is next door to the Reservation.

The commentor states that the Tribal criterion cannot be an ARAR since it "may effectively preclude certain remedial actions on Tribal lands, and certainly precludes land disposal of sediments from the unnamed tributary and the Raquette River on Tribal lands." It seems that the commentor is referring to the provision of CERCLA which states:

> Except as provided in clause (ii) . . . , a state standard, requirement, criteria, or limitation . . . which could effectively result in the state-wide prohibition of land disposal of hazardous substances, pollutants or contaminants shall apply.

Section 121(d)(2)(B)(ii) of CERCLA.

Under clause (iii), the Tribal standard would not be an ARAR if it could be demonstrated that the "requirement . . . was adopted for the purpose of precluding remedial actions or other land disposal for reasons unrelated to protection of human health and the environment." CERCLA § 121(d)(2)(B)(iii)(II).

EPA has no reason to believe that the Tribe promulgated its PCB sediment criterion in order to preclude remedial actions on reservation land, or for reasons unrelated to protection of human health and the environment, and has therefore determined that the criterion is applicable. Further, it cannot be said with any

degree of certainty that the Tribe's promulgation of protective criteria will effectively preclude land disposal on Reservation land. As would be the case if EPA were examining New York State criteria, states promulgate protective cleanup standards, but permit land disposal, so long as such disposal is done in a manner that is protective of human health and the environment and in accordance with applicable environmental laws.

Comment: Section 300.515 of the NCP also confirms that the lead and support agencies must identify their respective potential ARARs during the scoping of the RI/FS.

G.M. has no specific information showing that final Tribal Council standards were identified to EPA in a timely manner in compliance with the requirements of the NCP or CERCLA. G.M. received notice of the proposed standards only in January, 1989. Therefore, a cleanup level of 0.1 ppm PCBs based on Tribal "requirements" as stated in EPA's plan is not an ARAR under CERCLA.

Response: G.M. received notice of the proposed Tribal ARARs on January 1989. The FS was released in November 1989. EPA considers this timely notice of potential ARARs by the Tribe.

Comment: Since 0.1 ppm PCBs in sediments may be technically impracticable even if the Tribal standards comply with the procedural requirements of CERCLA and the NCP, the 0.1 ppm standard should be waived by EPA.

Response: During dredging, EPA will attempt to meet the Tribal PCB ARAR of 0.1 ppm PCBs in Turtle Creek. However, based on limited previous experience at other Superfund sites and federal projects, dredging to 0.1 ppm PCBs may be technically impracticable. Therefore, EPA is waiving the Tribal sediment standard where it proves to be technically impracticable to achieve during dredging.

Comment: EPA stated in its plan that the cleanup standard for ground water at the Site will be 0.1 ppb PCBs "based on New York State requirements." EPA cites New York State requirements concerning limits for Class GA ground water as the authority for treatment of ground water to 0.1 ppb. A maximum level of 0.1 ppb PCBs in ground water, however, is not a requirement that was developed by New York State to define necessary levels of aquifer remediation. These regulations were developed for the purpose of prospectively protecting potable ground water. Because this criterion was not meant to establish levels of aquifer remediation, it is not applicable to this remedial action. The criterion is also not relevant and appropriate to this Site.

Response: New York State has the authority and responsibility for developing classification standards for ground water aquifers. EPA's authority under CERCLA includes appropriately implementing state ARARs when they exist. EPA concurs with New York State that

their ground water classification system is an appropriate ARAR for the Site.

Comment: The natural characteristics of the aquifer do not favor the use of ground water in the vicinity for drinking water wells and does not support classification of the ground water as GA water.

Response: New York State has the authority and responsibility for developing classification standards for ground water aquifers. EPA's authority under CERCLA is limited to appropriately implementing state ARARs when they exist. EPA concurs with New York State that their ground water classification system is an appropriate ARAR for the Site.

Comment: New York State standards are not relevant and appropriate for the Site because there are currently no drinking water wells on the Site, and ground water is very unlikely to be used in this location as a future drinking water source. The local aquifers exhibit natural impurities, are of relatively low productivity, and surface water is available for use as a treatable drinking water source.

Response: EPA disagrees and points out that downgradient wells exist on the St. Regis Mohawk Reservation that could become contaminated in the future. Additionally, under CERCLA authority, the State of New York has the authority to establish ARARs and their own methods for classifying ground water quality.

Comment: A cleanup level for PCBs in ground water of 0.1 ppb is impossible to achieve given the adsorptive characteristics of PCBs. For this reason, the criterion is inappropriate and should be changed.

Response: During recovery and treatment, EPA's cleanup goal is the New York State PCB ARAR of 0.1 ppb PCBs. Based on EPA studies of other sites, EPA has found that the final groundwater cleanup level will depend on technical considerations such as the propensity of PCBs to sorb to soil. If during implementation of the remedy the groundwater cleanup goal of 0.1 ppb PCBs proves impossible to achieve, EPA will consider modifying the groundwater recovery and treatment portion of the selected remedy.

Comment: EPA's ROD should indicate the uncertainty associated with achieving cleanup goals in ground water, and should discuss the possibility (1) that information gathered during the implementation of the remedy may reveal that it is technically impractical to achieve health-based concentrations throughout the area of attainment, and (2) that another remedy or a contingent remedy may be needed.

Response: The first operable unit ROD explains that the final groundwater cleanup level will depend on technical considerations such as the propensity of PCBs to sorb to soil. If during implementation of the remedy, the groundwater cleanup goal of 0.1 ppb PCBs proves impossible to achieve, EPA, in conjunction with New York State and the St. Regis Mohawk Tribe, will consider modifying the groundwater recovery and treatment portion of the selected remedy.

Comment: It is technically infeasible to monitor PCBs in ground water or discharge water reliably at a level of 0.1 ppb. A Method Detection Limit (MDL) of 0.065 ppb PCBs (Method 608, developed under the Clean Water Act) for Aroclor 1242, using pure PCBs and reagent water is the basis for EPA's 0.1 ppb ground water cleanup level for PCBs at the Site. The Method 608 MDL, however, does not define detection limits for other Aroclors or for environmental water samples. Past analyses of water samples from the Site indicate that minimum detection levels of Aroclor 1248 have had to be adjusted regularly to account for matrix-related chemical interference with the analyses. Data from the Site indicate that when using Contract Laboratory Program (CLP) methods for quantifying Aroclor 1248, the quantification limit is 0.5 ppb. Because of this limit, compliance with EPA's proposed 0.1 ppb standard cannot be demonstrated, regardless of the level of treatment.

Response: EPA notes that G.M.'s current monitoring of its PCB discharges to the St. Lawrence River achieves a detection limit of 65 ppt PCBs. Non-CLP methods may be required to achieve the analytical detection limits required in surface water.

Comment: A cleanup standard of 0.1 ppb is five times higher than the 0.5 ppb maximum contaminant level (MCL) recently proposed by EPA for potential drinking water sources (54 Fed. Reg. 22062, May 22, 1989). According to Superfund guidance concerning removal action levels at contaminated drinking water sites, MCLs, if available, are generally considered to be the appropriate cleanup standard. (OSWER Directive No. 9360.1-10, October 6, 1987.)

Response: CERCLA and the final NCP are appropriate references for information on how EPA sets site cleanup goals. The groundwater PCB cleanup goal selected by EPA of 0.1 ppb, as measured at the boundary if the Industrial Landfill and Industrial Lagoons, is based on New York State requirements. The NCP states (40 CFR Part 300.400(g)(4)) that state standards which are more stringent than federal requirements may be ARARs.

ST. REGIS MOHAWK TRIBE

NOTE: The St. Regis Mohawk Tribe has had a change in leadership since the close of the EPA public comment period. Consequently, the Tribe, in a letter to EPA dated October 31, 1990, provided

additional comments to those which were submitted during the public comment period. EPA has, in this Responsiveness Summary, presented and responded to those comments submitted by the Tribe during the public comment period. However, EPA considered the Tribe's October 31, 1990 comments in finalizing the first operable unit ROD. The St. Regis Mohawk Tribe has concurred with the first operable unit ROD which reflects EPA's consideration of the October 31, 1990 comments. A copy of the Tribe's October 31, 1990 letter to EPA is contained in the Administrative Record for this Site.

Proposed Plan

Comment: The Tribe supports EPA's preferred remedial alternative for the Industrial Lagoons, but expressed concern that biological treatment may not be viable given that the lagoons contain significantly higher levels of phenols than PCBs.

Response: While EPA believes that biological treatment holds promise to significantly reduce the volume and toxicity of contaminants, it recognizes that biological treatment is an innovative technology. Therefore, other PCB treatment technologies will be tested concurrently with biological destruction so that EPA will have additional information in the event that biological destruction proves to be unsatisfactory for treatment of any Site material. Biological treatment will be used wherever EPA determines it to be viable. In the event that biological treatment is ineffective for a certain area of the Site or for certain Site materials, other PCB treatment technologies may be employed.

Comment: The Tribe supports EPA's preferred remedial alternative for groundwater.

Response: No response necessary.

Comment: There is no data to support the biological treatment alternative considering the nature and extent of contamination present at the Site. EPA should conduct parallel field-testing of other suitable, innovative, permanent treatment technologies listed in the Proposed Plan in the event that biological treatment proves unsuitable.

Response: In response to comments from the Tribe and others, other PCB treatment technologies will be tested concurrently with biological destruction so that EPA will have additional information in the event that biological destruction proves to be unsatisfactory for treatment of any Site material. Biological treatment will be used wherever EPA determines it to be viable. In the event that biological treatment is ineffective for a certain area of the Site or for certain Site materials, other PCB treatment

technologies may be employed. The criteria used to judge the treatment technologies during treatability testing include effectiveness and cost.

Comment: The Tribe supports EPA's preferred cleanup alternative for the North and East Disposal Areas, contaminated soils on the St. Regis Reservation, and contaminated soils on G.M. property but is concerned about the possibility of residual on-site soils, sludge and debris (10 ppm) leaving the property and recontaminating Reservation property. The Tribe requests that specific run-off control measures be included in the remedial design. Also, it requested that clean fill be used to replace excavated soils from the Reservation, and the Reservation property be returned to normal conditions.

Response: EPA has incorporated run-off control measures and restoration of Reservation soil into its ROD.

Cleanup Levels

Comment: The Tribe supports EPA's preferred cleanup alternative for Area 1 of the Site, but objects to EPA's selection of a 2 ppm PCB cleanup level in the St. Lawrence River.

Response: EPA has selected a 1 ppm cleanup level in the St. Lawrence and Raquette Rivers. The 1 ppm PCB cleanup in the St. Lawrence and Raquette Rivers was based on interim federal and State sediment quality criteria guidance as well as on EPA's risk assessment. Application of interim federal sediment quality criteria guidance indicates that a PCB cleanup level in sediments should be between 0.08 and 2 ppm. State sediment quality criteria guidance indicates that PCB cleanup levels well below 1 ppm are required to achieve protection of the environment. EPA's risk assessment for the Site demonstrates that a 1 ppm PCB cleanup level in sediment corresponds to a 4×10^{-5} excess cancer risk.

Therefore, in an attempt to minimize residual risks, EPA has selected 1 ppm as a cleanup goal in the St. Lawrence and Raquette Rivers. In selecting the 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers, EPA has also balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers is achievable and provides an acceptable measure of protection to human health.

Remediation

Comment: The length of remediation can be shortened by utilizing different technologies. The current estimate of 10 years is based on a thermal destruction facility capacity of 4.2 tons per hour. Facilities exist today that can treat 20 tons per hour in 3 years

time assuming an on-line efficiency of 80% and waste estimate of 421,000 cubic yards. The use of two systems could shorten the treatment period to 1.5 years. A shortened treatment period is warranted because it would greatly reduce the risks associated with exposure time.

Response: During the Remedial Design phase of the project, EPA will optimize operating parameters for any treatment technologies employed at the Site.

Comment: The Industrial Landfill appears to be a continuing and active source of PCB releases to the St. Lawrence River. Immediate ground water control measures should be implemented to prevent the flow of PCBs from the Industrial Landfill into the St. Lawrence River. If dredging of the St. Lawrence River is to be effective, the source of PCBs should be eliminated. In addition, the Tribe will consider the possibility of an "interim" cap while in-place, permanent treatment technologies are investigated. However, additional sampling should be conducted at the Industrial Landfill to further delineate the nature and extent of contamination, since the contents of the landfill remain largely unknown. In addition, because there will be a potential risk to the Mohawk community from contaminants leaching from the Industrial Landfill, the Tribe requests a central role in the ongoing monitoring of the landfill.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

The design of any monitoring systems will be performed or overseen by EPA, in conjunction with the St. Regis Mohawk Tribe, NYSDEC, and the Canadian Government. With respect to the Superfund program, EPA treats the St. Regis Mohawk Tribe in essentially the same manner as a State.

Cost

Comment: The cost of the incineration alternative ($476 to $640 per ton) is overestimated. A more accurate estimate would be $200 per ton based on similar projects conducted by Cross/Tessitore Associates.

Response: The costs noted in the FS are an estimate for purposes of comparison only. A variety of site-specific criteria will determine actual incineration costs.

MOHAWK COUNCIL OF AKWESASNE

Remedial Investigation/Feasibility Study

Comment: Data collected by NYSDEC indicate heavy PCB contamination of sediment in Contaminant Cove on Mohawk territory, an area of roughly 4 acres. Contaminant Cove is located at the mouth of Turtle Creek and adjacent to the Industrial Landfill. Contaminant Cove was not included in the Proposed Plan. Approximately 20 acres of sediment upstream from Contaminant Cove is also potentially contaminated, extrapolating from available data.

Response: The so-called "Contaminant Cove" was included in EPA's Proposed Plan and was considered part of Turtle Creek. EPA approximates that the limits of the PCB hotspot in Turtle Creek extend from the cove at the mouth of Turtle Creek to a point 2500 feet upstream from the mouth of Turtle Creek.

Comment: Less than 20% of the material in the lagoons and none of the soil located beneath the lagoons has been characterized. An overwhelming lack of information about the nature and extent of contamination precludes rational selection of a treatment alternative for the lagoon area. In particular, the selection of biodegradation may be ill-advised if concentration of phenols are as high as preliminary results in the RI have suggested.

Response: EPA has sufficiently characterized the Site to select a remedial alternative for the Industrial Lagoons. During the remedial design phase, EPA will further delineate the design and operating parameters of the selected alternatives. While EPA believes that biological treatment holds promise to significantly reduce the volume and toxicity of contaminants, it recognizes that biological treatment is an innovative technology and subsequently has included limited additional treatability studies in the ROD in case biological treatment proves ineffective.

Comment: The volume of material in the Industrial Landfill that is contaminated with over 500 ppm of PCBs is greatly overstated in the FS and Proposed Plan. The results of the RI indicate that the volume of landfill material containing over 500 ppm approximates 71,000 cubic yards, whereas a volume of 305,000 cubic yards is given in the FS and Proposed Plan. Overstatement of the volume of contaminated soil results in a significant overestimate of cleanup costs. EPA needs to explain why the volume of contaminated material in the Industrial Landfill increased significantly between what was stated in the RI versus what was stated in the FS.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal

guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

Proposed Plan

Comment: The Industrial Landfill should be permanently remediated by destroying PCBs and other hazardous materials rather than remediating by containment, which is not a permanent option.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

Comment: EPA should reject biodegradation as a treatment alternative unless or until it has been shown to be effective on the basis of treatability studies, pilot studies and field testing at the Site. Of the available treatment alternatives reviewed in the FS and Proposed Plan, biodegradation is the most flawed scientifically; it is also technically the most difficult to implement. Therefore, it can be predicted with a high degree of confidence that biodegradation will not succeed in remediating the G.M. Site.

Response: EPA does not believe that biological treatment is scientifically flawed; rather, EPA believes that it holds promise to significantly reduce the volume and toxicity of Site PCBs. Other PCB treatment technologies will be tested concurrently with biological destruction so that EPA will have additional information in the event that biological destruction proves to be unsatisfactory for treatment of any Site material. Biological treatment will be used wherever EPA determines it to be viable. In the event that biological treatment is ineffective for a certain area of the Site or for certain Site materials, other PCB treatment technologies may be employed.

Comment: The effectiveness of biodegradation as a treatment remedy for all hazardous chemicals in all areas of the Site should be demonstrated.

Response: Biological treatment will be tested to demonstrate its effectiveness in treating Site contamination.

Comment: EPA should conduct pilot studies and field tests of alternative treatment technologies, such as chemical extraction, thermal extraction, and chemical dechlorination, prior to the ROD. These technologies are likely to be significantly more effective

and cost-effective than biodegradation because they are capable of remediating a number of hazardous organic chemicals that are present at the Site.

Response: Other PCB treatment technologies will be tested concurrently with biological destruction so that EPA will have additional information in the event that biological destruction proves to be unsatisfactory for treatment of any Site material.

Comment: EPA should characterize the more than 80% of liquid, sludge and underlying soil in the lagoon area prior to final remedy selection and signing of the ROD. In addition, biodegradation is not an effective remedial treatment for the lagoons because the major lagoon contaminants are phenol, substituted phenols and polycyclic aromatic hydrocarbons (PAHs), not PCBs.

Response: EPA believes that the lagoons have been adequately characterized to select a remedy. Treatability studies will be conducted during the remedial design on biological treatment and other treatment technologies.

Cleanup Levels

Comment: The Mohawk Tribal PCB standards should be applied as ARARs for the entire Site like the NYSDEC standards are applied to the entire Site. Territory belonging to the St. Regis Mohawk Tribe and bordering G.M. property to the east and north constitutes an integral part of the Site. The inseparability of Mohawk territory and G.M. property on the Site results in the relevance and applicability of Tribal PCB standards for the entire Site.

Response: The St. Regis Mohawk Tribe's ARARs are applicable on the Reservation. EPA has the statutory obligation to implement ARARs identified to it. The remedy reflects this process.

Comment: The TSCA regulations are not appropriate for the G.M. Site. However, the granting of a waiver of TSCA regulations, as recommended in the Proposed Plan, could conceivably result in the removal of all legal requirements to successfully treat material contaminated with 500 ppm or less of PCBs if biological treatment fails. Once the TSCA waiver is granted, it could conceivably be legal to leave at the Site any material containing 500 ppm or less of PCBs that cannot be treated successfully by the biodegradation process. The proposed TSCA waiver urgently requires clarification in order to ensure that health-based cleanup standards are not replaced by biodegradation performance standards.

Response: EPA believes that TSCA regulations are applicable for this Site. EPA has clarified the meaning of its limited waiver of certain TSCA requirements.

According to TSCA disposal regulations and policy, soil treatment residuals with PCB concentrations above 2 ppm must be disposed in a TSCA chemical waste landfill. However, in accordance with TSCA regulations (40 CFR 761.75(c)(4)), EPA is waiving certain TSCA chemical waste landfill requirements for treatment residuals with PCB concentrations above 2 ppm and below 10 ppm. Specifically, EPA is waiving the TSCA requirements on landfill location, the TSCA requirement specifying the locations of groundwater monitoring wells, and the TSCA requirement for a leachate collection system. These TSCA chemical landfill requirements are being waived because soil treatment residuals which meet Site cleanup standards do not present an unreasonable risk of injury to health or the environment from PCBs.

Remediation

Comment: Monitoring of excavated material and treatment residues should be an integral part of the Proposed Plan.

Response: Groundwater monitoring is part of the selected remedy. However, residuals which are disposed as specified in the ROD and are at or below health based levels will not require monitoring.

Comment: Only 15,000 cubic yards of Mohawk territory, roughly corresponding to 6 acres of Turtle Creek sediment to a depth of 2 feet, are included in the FS/Proposed Plan recommendations. Based on the results of the RI, there are approximately 6 acres of contaminated sediment and 14 acres of contaminated soil on Mohawk territory east of the G.M. property line.

Response: The volumes given in the FS are estimates only and will be refined during remedial action implementation. EPA believes that the volumes presented in the comment may be overestimated.

Cost

Comment: The cost of biodegradation is the same as or greater than the cost of other treatment alternatives. From the standpoint of environmental protection, biodegradation is the least cost-effective of the treatment alternatives considered for material contaminated with 500 ppm or less of PCBs.

Response: EPA disagrees with this comment. Biodegradation is the least expensive of the treatment alternatives which permanently destroy PCBs.

Comment: The average unit incineration costs projected in the Proposed Plan are $687 per cubic yard. This unit cost exceeds the high end of the market range ($100-$500 per cubic yard, assuming a cubic yard weighs a ton). The cost of incineration can be reduced by a factor of 3 to 5 by selecting a technology vendor at the lower end of the market range for incineration.

Response: Incineration unit costs as given in the FS are $350 per cubic yard. The $687 per cubic yard figure includes costs associated with materials handling and residuals disposal.

Other

Comment: The ROD must include a public education program; treatability study to determine the effectiveness of the proposed remedial technologies; procedures and protocols for public and government control of the proposed remedial actions, as well as oversight capabilities; and additional contaminant sampling and analysis in the lagoon.

Response: Monitoring of the remedial action will be performed or overseen by EPA, NYSDEC, the Canadian government and the St. Regis Mohawk Tribe. With respect to the Superfund program, EPA treats the St. Regis Mohawk Tribe in essentially the same manner as a State. In addition, as part of the Superfund process, EPA actively solicits public involvement in all activities. The Superfund statute also provides mechanisms for financing public participation in the remedial process, such as provision of technical assistance grants for hiring of consultants.

ST. LAWRENCE ENVIRONMENT TRUSTEE COUNCIL
(includes representatives from the St. Regis Mohawk Tribe, New York State, National Oceanic and Atmospheric Administration and the Department of the Interior)

Comment: The St. Lawrence Environment Trustee Council supports EPA's preferred cleanup alternative for Area 1 of the Site, but objects to EPA's selection of a 2 ppm PCB cleanup level in the St. Lawrence River. The 2 ppm cleanup level will not be adequately protective of living resources in the St. Lawrence River environment. Several studies which looked to the relationship of sediment PCBs to PCB body burdens in aquatic organisms, particularly fish, have found that PCB sediment concentrations of 0.1 ppm or less are reasonably protective of aquatic organisms, and concentrations any higher could have chronic toxic effects. Therefore, the cleanup level in the St. Lawrence River should be 0.1 ppm.

Response: EPA's selected 1 ppm PCB cleanup in the St. Lawrence and Raquette Rivers was based on interim federal and State sediment quality criteria guidance as well as on EPA's risk assessment. Application of interim federal sediment quality criteria guidance indicates that a PCB cleanup level in sediments should be between 0.08 and 2 ppm. State sediment quality criteria guidance indicates that PCB cleanup levels well below 1 ppm are required to achieve protection of the environment. EPA's risk assessment for the Site demonstrates that a 1 ppm PCB cleanup level in sediment corresponds to a 4×10^{-5} excess cancer risk.

Therefore, in an attempt to minimize residual risks, EPA has selected 1 ppm as a cleanup goal in the St. Lawrence and Raquette Rivers. In selecting the 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers, EPA has also balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers is achievable and provides an acceptable measure of protection to human health.

Comment: The Industrial Landfill appears to be a continuing and active source of PCB releases to the St. Lawrence River. Immediate ground water control measures should be implemented to prevent the flow of PCBs from the Industrial Landfill into the St. Lawrence River. If dredging of the St. Lawrence River is to be effective, the source of PCBs should be eliminated.

Response: EPA's selected remedy includes groundwater recovery and treatment to mitigate the flow of Site leachate to the river system.

CORNELL UNIVERSITY

Public Participation

Comment: EPA should give the utmost consideration to the comments and recommendations of the St. Regis Mohawk Tribe and their elected representatives in revising the Proposed Plan and before issuing a ROD.

Response: Tribal acceptance is one of nine criteria used by EPA in selecting remedial actions. Tribal acceptance of EPA's remedy is viewed as a modifying criteria which may alter EPA's selected remedy.

Comment: The St. Regis Mohawk Tribe, because of its geographical location in relation to the Site, among other reasons, should be given a great deal of oversight over any remediation technologies used to clean up the G.M. Site.

Response: EPA agrees.

Risk Assessment

Comment: The risk assessment should be reformulated for a 175 year population exposure period to take into account the Mohawk view of the full Circle of Life. The ARARs submitted by the St. Regis Mohawk Tribe are in line with that philosophy, and failure to achieve them will reflect a continued impact on the people and the ecosystem.

Response: Although the NCP directs EPA to account for Indian Tribal Laws in formulating ARARs, there is no provision for taking customs, mores, or religious views into account. An exposure of 175 years is well beyond the range of scientifically documented life spans.

Comment: Many particulars needed for the risk assessment are either missing or were disregarded by EPA's risk assessment consultant. Additionally, there was not a full consideration of uncertainty analysis. Therefore, the estimates of risk may be inappropriate, and to the extent that the risk assessment is inaccurate, it could negatively affect the St. Regis Mohawk Tribe for many decades.

Response: The risk assessment was conducted in accordance with current EPA guidance, regulation, and policies for risk assessments. The discussion of uncertainty presented in the baseline risk assessment is consistent with standard risk assessment practice for characterizing uncertainties in addition to complying with guidance.

Comment: The ROD should address ecotoxicologic (non-human health) impacts of the G.M. Site and the attendant actions and policies.

Response: EPA, along with NOAA and NYSDEC, are continuing to assess potential environmental impacts of the G.M. Site and will address these impacts in subsequent decisions. There are no standard quantitative methods for estimating environmental risks which are analogous to the methods EPA uses to evaluate human health risks.

Comment: The amount of PCB-contaminated material at the Site is unknown. Since estimates have ranged considerably, this primary uncertainty should be factored into all calculations.

Response: The volumes and costs presented in the RI, FS and risk assessment are estimates for purposes of developing and comparing alternatives.

Cleanup Levels

Comment: EPA should consider other remediation technologies besides biodegradation and incineration, and should field test remediation technologies concurrently, especially in light of the fact that biodegradation is not a proven technology and has no data to support its effectiveness.

Response: Other PCB treatment technologies will be tested concurrently with biological destruction so that EPA will have additional information in the event that biological destruction proves to be unsatisfactory for treatment of any Site material. Biological treatment will be used wherever EPA determines it to be viable. In the event that biological treatment is ineffective for

a certain area of the Site or for certain Site materials, other PCB treatment technologies may be employed. The criteria used to judge the treatment technologies during treatability testing include effectiveness and cost.

Comment: The St. Regis Mohawk Tribe's cleanup standards for sediment, water and soil should be used throughout the cleanup area because they are stricter and will better protect the health of the river ecosystem.

Response: The St. Regis Mohawk Tribe's ARARs are applicable on the Reservation. EPA has the statutory obligation to implement ARARs identified to it. The remedy reflects this process.

Remediation

Comment: The 12-month St. Lawrence Seaway revitalization project may be impacted, or impact, remediation at the G.M. Site. The Seaway revitalization project could result in Seaway traffic, resuspension or release of deeper residue, or loading of the G.M. Site from upstream sources.

Response: EPA appreciates this comment and will take it into consideration during the Remedial Design phase of the project.

Cost

Comment: The cost of the incineration alternative is overestimated and should be recalculated. Cost is important to the many people in the Massena area who are legitimately concerned about the future of industry there. If EPA's estimations were recalculated according to realistically lower figures, many people may not feel obligated to support G.M.'s plans, and G.M. would perhaps be more willing to cooperate with EPA's plans.

Response: A number of factors must be considered when determining relative costs for remedial alternatives. The costs outlined in the Proposed Plan are within industry norms for similar remediation efforts. During the remedial design, EPA will further delineate the operating parameters and refine the cost estimates.

ST. LAWRENCE UNIVERSITY

Proposed Plan

Comment: The St. Lawrence University representative supports EPA's preferred remedial alternative for the contaminated river and tributary sediments. The risk of resuspension of contaminated sediments with subsequent transport downstream can be minimized by use of techniques, such as coffer dams and silt curtains with monitoring, to isolate the area dredged. The in-situ containment

alternative is not acceptable because it cannot guarantee permanent stabilization of PCB-contaminated sediments.

Response: No response necessary.

Comment: Several treatment technologies, not just in situ biological treatment, should be evaluated so that a suitable, innovative and permanent treatment technology can be implemented as rapidly as possible.

Response: Other PCB treatment technologies will be tested concurrently with biological destruction so that EPA will have additional information in the event that biological destruction proves to be unsatisfactory for treatment of any Site material. Biological treatment will be used wherever EPA determines it to be viable. In the event that biological treatment is ineffective for a certain area of the Site or for certain Site materials, other PCB treatment technologies may be employed.

Cleanup Levels

Comment: The Tribal requirement of .1 ppm for PCBs in sediments should remain the cleanup goal for all PCB-contaminated sediments, both in the St. Lawrence River as well as in the tributaries. Since the major route of exposure to human populations near the Site is ingestion of fish and wildlife, and the St. Regis Mohawk Tribe traditionally fishes in the St. Lawrence River and hunts along its shores, there is a risk to the Tribe and other local citizens from continuing contamination of fish and wildlife by even relatively low levels of PCBs remaining in the treated sediments.

Response: The St. Regis Mohawk Tribe's ARARs are applicable on the Reservation. However, they were considered and found to be inappropriate for non-Reservation lands because they could not be consistently applied. EPA does not agree that Mohawk territory is inseparable from the rest of the Site since Reservation boundaries are clearly denoted.

The 1 ppm PCB cleanup in the St. Lawrence and Raquette Rivers was based on interim federal and State sediment quality criteria guidance as well as on EPA's risk assessment. Application of interim federal sediment quality criteria guidance indicates that a PCB cleanup level in sediments should be between 0.08 and 2 ppm. State sediment quality criteria guidance indicates that PCB cleanup levels well below 1 ppm are required to achieve protection of the environment. EPA's risk assessment for the Site demonstrates that a 1 ppm PCB cleanup level in sediment corresponds to a 4×10^{-5} excess cancer risk.

Therefore, in an attempt to minimize residual risks, EPA has selected 1 ppm as a cleanup goal in the St. Lawrence and Raquette Rivers. In selecting the 1 ppm cleanup goal in the St. Lawrence

and Raquette Rivers, EPA has also balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers is achievable and provides an acceptable measure of protection to human health.

Other

Comment: A permanent remedy should be selected for the Industrial Landfill because of the large number of PCB-contaminated materials (424,000 cubic yards), the high concentrations of PCBs in the materials, and the landfill's proximity to the St. Lawrence River. A "permanent" cap would not be adequate to prevent further ground water contamination and migration.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

PUBLIC ADVISORY COMMITTEE (PAC) for ST. LAWRENCE REMEDIAL ACTION PLAN

Public Participation

Comment: Canadians were given no consultative status until March 1990. Other affected groups, such as the St. Regis Mohawk Indians and New York State, were consulted prior to March 1990. The Canadians clearly are a largely affected group when one considers that this population is downstream and downwind of the Site. Why were they not included in the public participation process before?

Response: Canadians are not afforded the same rights as States in the Superfund process. However, EPA has sought Canadian government input in the Superfund process for this Site in the past and is committed to seeking Canadian input on monitoring of remedial actions in the future.

Comment: The Canadian people should have the right to participate in the determination of all remedial options, monitor all remedial actions, and cause the cessation of remedial actions if they are deemed to adversely affect Canadian health and welfare. PAC particularly expects this right as it pertains to three issues:

- the processes used in dredging contaminated sediments from the riverbeds and the potential re-suspension of contaminants;

- the processes used in excavation at the Site and the potential dangers of airborne dust carried into Canadian lands and waters; and,

- the selection of a permanent solution for the destruction of PCB-contaminated materials present in the soils and waters at, and around, the Site.

Response: Canadians are not afforded the same rights as States in the Superfund process. However, EPA has sought Canadian government input in the Superfund process for this Site in the past and is committed to seeking Canadian input on monitoring of remedial actions in the future.

Cleanup Levels

Comment: One cleanup level should be utilized at the lowest ARAR for each media. Using the argument of accessibility in justifying varying cleanup levels in different areas is not viable since future uses of the property may change this accessibility.

Response: ARARs are defined by CERCLA and the NCP to be the requirements of other environmental laws which apply to the Site or are relevant and appropriate to the circumstances of the Site. The lowest ARAR has been considered in selecting Site cleanup levels. However, it should be noted that St. Regis Mohawk Tribal regulations are not ARARs for non-Reservation lands.

Comment: Canadian ARARs are as follows:

- 50 ppb (ug/kg) for sediments
- 1000 ppb (ug/kg) for soils
- 0.1 ppb (ug/L) for ground water
- 65 ppt (ng/L) for surface water discharge.

These ARARs agree with select ARARs of New York State, the St. Regis Mohawk Indians and the Ontario Ministry of the Environment guideline for Open Water Disposal of Dredged Sediment. PAC expects that the ARARs as defined above will be applied to any area that has been contaminated by PCBs from the G.M. facility.

Response: EPA is restricted by the CERCLA and SARA legislation and the implementing guidance outlined in the NCP and other documents to specific criteria to be considered when determining an ARAR. The cleanup levels recognized by the Canadian government do not meet this criteria. However, EPA has endeavored to select cleanup levels and technologies that will be effective in remediating the PCB contamination present on-site. The ROD presents a full discussion of the cleanup levels selected for the Site.

Remedial Alternatives

Comment: All dredged sediments should be deposited on the Site and appropriately landfilled if under 1 ppm or appropriately treated if over 1 ppm. PAC believes that contaminated sediments should be removed to the fullest extent possible. Limitations on sediment removal techniques, not concentrations, should be the guiding factor in sediment removal. The only acceptable concentrations in sediments is at which there will be no significant uptake in predatory fish.

Response: EPA has selected to dredge hot spot areas in the St. Lawrence River to a cleanup level of 1 ppm. EPA has defined PCB hot spot areas to be areas in the St. Lawrence River with concentrations above 1 ppm. These areas are within the vicinity of the G.M. outfall in the St. Lawrence River. The St. Lawrence River hot spot definition is based on federal and state sediment quality criteria guidance as well as on EPA's risk assessment. EPA has carefully balanced all site-specific characteristics against the nine criteria outlined in the NCP. Further, EPA believes that these cleanup levels will be protective of public health and the environment.

Comment: Treatment efficiency is enhanced when homogeneous materials are fed to a treatment operation. In situ sampling should be used to evaluate the concentrations of contaminants in various materials at various depths or locales so that a management plan can be developed that effectively utilizes all treatment modes for the reduction or elimination of amount, volume, and toxicity of contaminated media.

Response: EPA recognizes that treatment efficiency is enhanced when homogenous materials are treated. As a result, EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies which will be tested concurrently with biological treatment may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

Comment: The consolidation and storage of contaminated materials, without reduction of toxicity, in areas of restricted access is an unacceptable remediation technique. Stewardship of such an area by G.M. is an invitation to them to close the plant and walk away. Any excavated, consolidated and/or stored materials should be treated to minimum cleanup levels.

Response: For the first operable unit, EPA has not selected the consolidation and storage of any contaminated materials without prior treatment to reduce toxicity. EPA's ROD calls for biological

treatment (r another innovative technology) or incineration of all contaminated materials. To ensure that backup treatment technologies are available in case biological treatment does not prove effective enough in reducing toxicity, EPA has also included limited additional treatability studies in the ROD.

High Temperature Destruction

Comment: Reformed chemical products, products of incomplete combustion, undestroyed PCBs and residual organic toxins found in incinerator ash should all be evaluated to establish the destruction and removal efficiency of any high temperature incineration system utilized.

Response: Incineration has been demonstrated to be an effective technology for remediating PCBs in soils and sludges. As part of the remedial action, EPA will determine the operating parameters of the selected remediation and will evaluate the appropriate method to handle the fly ash residue.

Comment: If high temperature destruction is adopted, a performance standard for contamination in the ash should be one of the criteria used to determine effectiveness of the incineration technology. PAC will not support any destruction technology that has detectable concentrations of dioxin and furan.

Response: If incineration is required at the Site and all or part of the incinerator ash is tested and found to be hazardous, EPA will either treat the ash further to render it non-hazardous or dispose of the ash in compliance with hazardous waste requirements.

Comment: Reduction of both toxicity and quantity of contaminated materials should be an objective of the remediation. PAC is not convinced that high temperature incineration systems can attain a significant reduction of toxic materials.

Response: Incineration has been demonstrated as the most effective technology to treat PCB-contaminated soils and sludges. Current federal regulations for air emissions require a 99.9999% removal efficiency ensuring the effective reduction of contaminants.

Comment: Any high temperature destruction facility used should have, at a minimum, the following:

- monitoring systems that measure destruction efficiency continuously during combustion;
- an automatic cut-off system that immediately shuts down the incinerator if destruction efficiency falls; and,

- a facility that has a zero-discharge capacity, i.e., a closed loop system with no emissions (a stackless incinerator).

Response: EPA employs stringent environmental controls when implementing remediation at Superfund sites. At the Site, EPA will design the incinerator in full compliance with federal and state regulations.

Comment: High temperature incineration should not be permitted unless there is a full scale environmental monitoring program. This should include high volume air sampling and monitoring of land-based species that bioaccumulate PCBs quickly.

Response: The design of any incinerator monitoring systems used at the Site will be a joint effort between EPA, New York State, and the St. Regis Mohawk Tribe. The public will be consulted throughout.

Comment: High temperature incineration should be the technology of last resort because of the impact that it may have on the environment and populations in the area. PAC is particularly concerned that downwind populations will be adversely affected by emissions.

Response: EPA has determined that the use of on-site incineration should be minimized in the selected remedy. This determination was based on comments from the public and the Tribe which stated that incineration was the least preferred treatment method for the Site. As a result, EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies which will be tested concurrently with biological treatment may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

Comment: PCBs and toxic materials should be extracted from soils and sediments. Then, only the extracted contaminated material should be destroyed using high temperature destruction. This would make destruction easier and more controllable because of the less heterogenous nature of the waste being destroyed.

Response: EPA will test chemical and thermal extraction of Site media during treatability testing.

Risk Assessment

Comment: The Canadians have been excluded in the definition of exposed populations. Since Canadians drink the water downstream

of the Site and catch and eat fish from these waters, clearly they are a part of the exposed population.

Response: EPA fully recognizes that areas in Canada include some of the potentially exposed populations. The St. Regis Mohawk Tribe was selected as the exposed population for evaluation in the risk assessment to ensure that the most conservative analysis of impacts was utilized, since they are directly adjacent to the Site and thus have the most direct exposure. EPA has selected cleanup levels and remedial technologies for both the on-site contamination and that of hot spot areas within the St. Lawrence, Raquette Rivers and Turtle Creek, that will be protective of both public health and the environment.

Other

Comment: Although G.M. maintains that PCBs, shown to be present in the St. Lawrence River alongside the G.M. facility, do not move because they are in a sheltered bay, PAC firmly believes that G.M. is partly responsible for the PCBs proven to exist downstream in the St. Lawrence River and Lake St. Francois.

Response: EPA and NYSDEC are in close coordination in evaluating the overall PCB contamination problem within the St. Lawrence River.

Comment: TSCA chemical waste and landfill requirements should not be waived for the residuals from the innovative biological treatment process or deposits of incinerator ash.

Response: Only certain TSCA chemical waste landfill requirements are being waived in the selected remedy. According to TSCA disposal regulations and policy, soil treatment residuals with PCB concentrations above 2 ppm must be disposed in a TSCA chemical waste landfill. However, in accordance with TSCA regulations (40 CFR 761.75(c)(4)), EPA is waiving certain TSCA chemical waste landfill requirements for treatment residuals with PCB concentrations above 2 ppm and below 10 ppm. Specifically, EPA is waiving the TSCA requirements on landfill location, the TSCA requirement specifying the locations of groundwater monitoring wells, and the TSCA requirement for a leachate collection system. These TSCA chemical landfill requirements are being waived because soil treatment residuals which meet Site cleanup standards do not present an unreasonable risk of injury to health or the environment from PCBs.

Comment: After reviewing all available materials, PAC has determined that there are discrepancies in the PCBs used and discharged on the Site and PCB loadings measured at the Site. PAC therefore requests an audit of G.M.'s records in order to establish the number of PCBs dumped on the Site.

Response: EPA believes it has adequate information to determine an appropriate remediation plan for the first operable unit at the Site and at this point, does not believe an audit is warranted.

Industrial Landfill

Comment: The Landfill Disposal Area should be remediated in the same manner as other contaminated areas at the Site.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

ONTARIO MINISTRY OF THE ENVIRONMENT (MOE)

Comment: In the interest of ensuring timely remediation, remedial treatments other than bioremediation should be considered and tested.

Response: The selected remedy specifies that EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment is ineffective for a certain area of the Site, other treatment technologies, which will be tested concurrently with biological treatment, may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

Comment: Remediation of the St. Lawrence River sediments should include measures to reduce the resuspension of sediments during dredging, and should also consider the provision of a sediment cap to the dredged area and area of redeposition. Short-term onshore storage of contaminated sediments should also be explored to expedite the dredging, dewatering and secure storage of the sediments.

Response: EPA concurs with this comment.

Comment: The Ontario MOE would prefer a more stringent (than 2 ppm) cleanup criterion applied to the St. Lawrence River sediments and would settle for a less stringent (perhaps 25 ppm) criterion applied to all existing material on the G.M. property.

Response: EPA's selected remedy specifies a 1 ppm cleanup level in the St. Lawrence River. The cleanup level on the G.M. Site remains 10 ppm based, in part, on EPA's risk assessment for the

alternatives considered for the Site which indicates that 10 ppm is protective of the Indian population and, in part, on EPA guidance which recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to remediated areas will be unlimited to G.M. personnel and because contaminants in on-site soils may impact groundwater and surface water quality.

Comment: It is premature to conclude that there is no off-site migration of PCBs via ground water without first conducting further characterization of subsurface soils and ground water.

Response: EPA's selected remedy includes groundwater recovery and treatment to mitigate off-site migration of contaminants.

Comment: The Ontario MOE is concerned that, even though the Site is in close proximity to the Ontario border and the Site impacts Canadian portions of the St. Lawrence River, EPA and G.M. reports do not mention Canadian interests or the effects of the Site upon the Canadian environment.

Response: EPA fully recognizes that areas in Canada include some of the potentially exposed populations. The St. Regis Mohawk Tribe was selected as the exposed population for evaluation in the risk assessment to ensure that the most conservative analysis of impacts was utilized, since they are directly adjacent to the Site and thus have the most direct exposure. EPA has selected cleanup levels and remedial technologies for both the on-site contamination and that of hot spot areas within the St. Lawrence, Raquette Rivers and Turtle Creek, that will be protective of both public health and the environment.

ENVIRONMENT CANADA, FISHERIES AND OCEANS CANADA, HEALTH AND WELFARE CANADA, AND MINISTERE de l'ENVIRONMENT du QUEBEC

Comment: The Canadian Review Panel believes that additional sampling and analysis is required to fully characterize the extent of the contamination at the Site. Specifically, the panel believes the sampling has been deficient with regard to sediment sampling to define the total extent of the zone of contamination, particularly in depositional areas downstream of the Site in the St. Lawrence River and Lake St. Francis.

Response: EPA believes that it has sufficient data to choose remedial alternatives for the Site.

Comment: The panel also believes that the sampling has been deficient with regard to clearly identifying the sources and accurately characterizing the toxicities of the various Aroclors found in St. Lawrence River sediments adjacent to the Site; and resolving the apparent contradiction between the IT results which

identified only Aroclor 1242 in St. Lawrence River sediments and the Phase I RI findings which identified Aroclors 1232 and 1248.

Response: EPA, in coordination with NYSDEC, is evaluating potential PCB source areas of facilities adjacent to or in proximity to the Site. EPA also recognizes differences in the Aroclors present and believes they may be do natural dechlorination of the PCBs.

Comment: In addition, the panel believes the sampling has been deficient with regard to the depth and spatial density of on-site ground water monitoring wells which are not sufficient to identify the occurrence of dense non-aqueous phase liquids (DNAPL).

Response: EPA believes it has sufficient data to select a remedy to control migration.

Comment: The panel believes that the sampling has been deficient with regard to the calculation of sediment resuspension and downstream migration using proposed mechanical dredging/silt curtain methodology to assess risk which was based entirely on assumptions with no real data representing actual conditions (river velocity, cross-sectional profile, curtain efficiency, downstream current patterns, etc.).

Response: The FS utilized standard EPA methodology to calculate sediment suspension and downstream migration. Actual performance parameters will be developed during the remedial design and remedial action phases of Site remediation.

Comment: The panel believes that the sampling has been deficient with regard to quantification of sources and sediment contamination upstream of the Site, particularly to determine the potential for sediment recontamination following remediation.

Response: EPA recognizes that there are likely other source areas upgradient of the Site. EPA is coordinating the cleanup level for the river systems surrounding the Reynolds and ALCOA facilities.

Comment: In addition, the panel believes that the sampling has been deficient with regard to quality assurance and quality control protocols which need to be clearly described and improved for future analyses.

Response: All standard protocols for quality assurance/quality control were incorporated in the RI/FS for the Site.

Comment: The panel also believes that the sampling has been deficient with regard to collection of aquatic data from biota because the bioaccumulative characteristics of PCBs through the food chain present a significant risk to human health.

Response: EPA disagrees and believes adequate data has been collected to select a remedial alternative.

Comment: The panel believes that the sampling has been deficient with regard to projections of the trajectory and maximum dimensions of the incinerator stack plume.

Response: The evaluation of risks associated with a feasibility study does not require a risk assessment of the same depth as a baseline risk assessment. The assessment conducted for the incineration option is adequate to meet the requirement in this regard. In addition, numerous full scale risk assessments which have been conducted for hazardous waste incinerators show that the risks from normal operation are far greater than the risks from upset conditions. Therefore, the risks predicted by EPA for normal operations can be used as a benchmark. Published literature which evaluates indirect exposures to incinerator emissions (Chrostowski and Foster 1989) from incineration of dioxin in soils reveals risks below EPA's levels of concern for Superfund sites. These results appear to be applicable to the G.M. Site. Emission control devices on the incinerator are likely to limit metal emissions to negligible levels. Increased volatilization for PCBs will only be a small factor higher than baseline volatilization.

Comment: The Panel is concerned that the 10 ppm PCB cleanup level for soils is not stringent enough because the treated soils may continue as a potential source of contamination for the river sediments. The Panel also believes that the methodology used to determine the cleanup level for the St. Lawrence River is incorrect.

Response: EPA has selected a soil/sludge PCB cleanup level of 10 ppm on the G.M. facility. This level is based, in part, on EPA's risk assessment for the alternatives considered for the Site which indicates that 10 ppm is protective of the Indian population and, in part, on EPA guidance which recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to remediated areas will be unlimited to G.M. personnel and because contaminants in on-site soils may impact groundwater and surface water quality.

The 1 ppm PCB cleanup goal in the St. Lawrence and Raquette Rivers was based on interim federal and state sediment quality criteria guidance as well as on EPA's risk assessment. Application of interim federal sediment quality criteria guidance indicates that a PCB cleanup level in sediments should be between 0.08 and 2 ppm. State sediment quality criteria guidance indicates that PCB cleanup levels well below 1 ppm are required to achieve protection of the environment. EPA's risk assessment for the Site demonstrates that a 1 ppm PCB cleanup level in sediment corresponds to a 4×10^{-5} excess cancer risk.

Therefore, in an attempt to minimize residual risks, EPA has selected 1 ppm as a cleanup goal in the St. Lawrence and Raquette Rivers. In selecting the 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers, EPA has also balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers is achievable and provides an acceptable measure of protection to human health.

Comment: The Panel suggests that hydraulic dredging should be used in lieu of mechanical dredging for sediment removal.

Response: EPA has selected dredging as a component of the remedial alternative selected for PCB-contaminated sediments at the Site. During the design phase, EPA will determine the most appropriate type of dredging method to minimize sediment resuspension.

Comment: The Panel believes that sufficient data exist to indicate the presence of PCB DNAPL in the fill and glacial sediments adjacent to the lagoon and disposal areas. The Panel suggests that additional investigations should be implemented to define the presence and migration potential of the DNAPL. The Panel notes that this investigation should be completed prior to the initiation of on-site excavation and ground water pumping activities due to the potential for these activities to spread the DNAPL.

Response: Based on the information in the RI/FS and risk assessment, EPA does not believe sufficient data exists to indicate DNAPL is present in the fill and glacial sediments adjacent to the lagoon.

Comment: The Panel has concerns regarding the remediation techniques proposed for the Site. The Panel is unconvinced that bioremediation is feasible for such a large scale operation and suggests that alternative technologies should be identified in case the bioremediation is found not to be suitable. The Panel would also like assurances that appropriate pretreatment of waste materials would be performed prior to incineration activities.

Response: Other PCB treatment technologies will be tested concurrently with biological destruction so that EPA will have additional information in the event that biological destruction proves to be unsatisfactory for treatment of any Site material. Biological treatment will be used wherever EPA determines it to be viable. In the event that biological treatment is ineffective for a certain area of the Site or for certain Site materials, other PCB treatment technologies may be employed. The criteria used to judge the treatment technologies during treatability testing include effectiveness and cost.

Comment: In order to ensure that sediment dredging is conducted in as short a time-frame as possible, the Panel requests that more specific information be made available on dredging operations and wastewater treatment capacities and techniques.

Response: The ROD includes a detailed discussion of the dredging component of the remedial alternative to treat sediments in the St. Lawrence River, Raquette River, and Turtle Creek. Specific information on how the dredging operations are to be implemented, wastewater treatment capacities, and techniques to be utilized, will be developed in the design phase, subsequent to the signing of the ROD. EPA intends to continue its ongoing public involvement activities to solicit suggestions and comments throughout the remedial design and implementation. EPA looks forward to continued input from the Panel throughout the remaining remedial activities at the Site.

Comment: The Panel believes that the risk assessment should include residual and transient risks for human consumption of waterfowl and other biota such as turtles, and that the transient risk for workers and Mohawks should be re-evaluated based on more realistic time periods for the treatment of soils, wastes and river sediments.

Response: The risk assessment was conducted in accordance with EPA guidance, regulations, and policies for risk assessments. It is impossible to determine with any accuracy actual dredging times, and potential releases of suspended sediment. Gradient made many conservative (protective) assumptions however, to compensate for uncertainty. They assumed, for example, a dredging period of 172 days even though the actual dredging is likely to be much shorter. Additionally, the intrinsic conservatism of toxicological parameters ensures that the action will be protective of human health and the environment.

Comment: The Panel is concerned that even though there is extensive documentation of soil and sediment PCB concentrations, there are insufficient data regarding the specific PCB sources at the Site. The Panel believes that a great deal of effort and cost could be expended, particularly in the removal of river sediment, without being certain the major source to the river has been shut off. The Panel suggests that the overall remedial strategy must include the specific identification of loadings of PCBs and other chemicals from the various source areas on and adjacent to the Site.

Response: EPA believes that it has adequate information about the Site to select and implement an appropriate remedy. The majority of the PCBs currently in the St. Lawrence River were deposited in G.M.'s outfall prior to 1980. This source of contamination to the River has been mitigated through the New York State Pollution Discharge Elimination System.

Comment: The Panel suggests that a monitoring plan for the remedial actions should be developed which is acceptable to all affected parties, and requests that the Canadian authorities participate in the development of the plan.

Response: The design of any monitoring systems used at the Site will be a joint effort between EPA, New York State, the St. Regis Mohawk Tribe, and the Canadian government.

GREAT LAKES UNITED on behalf of:

Atlantic Chapter of the Sierra Club
Atlantic States Legal Foundation
Canadian Auto Workers Local 444
Canadian Environmental Law Association
Canadian Institute for Environmental Policy
Clean Water Alliance
Clearwater
Lake Michigan Federation
National Wildlife Federation, Great Lakes Natural Resource Center
Pollution Probe
Ontario Toxic Waste Research Coalition

Public Participation

Comment: EPA should work with a citizen oversight committee to assess, review, select, and monitor the remediation of all contaminants on the Site.

Response: As part of the Superfund process, EPA actively solicits public involvement in the assessment, review, and monitoring of EPA activities. EPA also encourages public input into the decision-making process. CERCLA and SARA are very clear, however, that the final remedial alternative decision-making authority rests with the EPA Regional Administrator. Throughout the RI/FS at the Site, EPA has strived to keep the public informed through public meetings, fact sheets, seminars and press releases. EPA looks forward to a continued close working relationship with interested U.S. and Canadian citizens, as well as the St. Regis Mohawk Tribe during the remedial design.

Remedial Alternatives

Comment: EPA and G.M. should assess other permanent treatment technologies in addition to incineration and biological treatment for all contaminants on the Site.

Response: Other PCB treatment technologies will be tested concurrently with biological destruction so that EPA will have additional information in the event that biological destruction proves to be unsatisfactory for treatment of any Site material.

Biological treatment will be used wherever EPA determines it to be viable. In the event that biological treatment is ineffective for a certain area of the Site or for certain Site materials, other PCB treatment technologies may be employed. The criteria used to judge the treatment technologies during treatability testing include effectiveness and cost.

Comment: If incineration remains the treatment technology chosen for materials contaminated above 500 ppm, EPA must select a thermal destruction technology and require pollution control equipment that will minimize, to the greatest degree, the release of any air pollutants.

Response:EPA agrees with the comment and EPA intends to meet all appropriate federal and state air quality regulations as part of the implementation of the selected remedy.

Cleanup Levels

Comment: Great Lakes United supports EPA's proposal to excavate and treat contaminated sediments in the St. Lawrence and Raquette Rivers and Turtle Creek. However, the cleanup levels for PCBs in sediments are not protective enough. The U.S. Fish and Wildlife Service has recommended a cleanup level of .05 ppm for other Superfund sites and the Kalamazoo River. This number is based upon bioaccumulation of PCBs in wildlife. **[references attached]**

Response: EPA's selected remedy for river sediments requires the delineation of PCB hot spots in the river system. At this Site, EPA has defined PCB hot spots to be areas with concentrations above 1 ppm in St. Lawrence and Raquette River sediments and above 0.1 ppm in Turtle Creek. The St. Lawrence River hot spot definition is based on federal and state sediment quality criteria guidance as well as on EPA's risk assessment. The 0.1 ppm hot spot definition for the Turtle Creek is based on Tribal regulations.

Other

Comment: A PCB audit should be conducted for the Site. The burden of proof should be on G.M. to document the destination of any PCBs that are unaccounted for in the audit.

Response: EPA believes it has adequate information to determine an appropriate remediation plan for the first operable unit at the Site, and at this point, does not believe that an audit is warranted.

Industrial Landfill

Comment: EPA should identify a preferred option for the Industrial Landfill. This option should be a specific, permanent treatment strategy which will address all contaminants.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

CORNWALL AGAINST POLLUTION

Remedial Alternatives

Comment: The incineration of PCBs does not eliminate the pollution. It merely changes the form. The products of incomplete combustion may include highly toxic dioxin or dibenzofuran. Additionally, elevated levels of heavy metals could be expected in the incinerator ash which would then require disposal. Cornwall Against Pollution is not prepared to contribute to the profits of G.M. with its health.

Response: EPA has selected a combination of biological treatment (or another innovative treatment technology) and incineration as the remedial alternatives to be implemented at the Site, to ensure the protection of public health and the environment. While biological treatment is a relatively new and innovative technology, EPA believes it holds promise to significantly reduce the volume and toxicity of contaminants. Additionally, as a backup, EPA has included limited additional treatability studies in the ROD in case biological treatment proves to be ineffective. Incineration has been demonstrated to be the most effective permanent remedy for the destruction of PCBs and has been successfully implemented at other Superfund sites. EPA intends to implement stringent controls on all aspects of the selected remedy and intends to meet all appropriate federal and state air quality regulations as part of the implementation of the selected remedy. EPA will also handle any residue materials, including the fly ash, in compliance with all applicable requirements.

Comment: By proposing incineration which would result in harmful air emissions to Canada, EPA has chosen to export a portion of its pollution problem. This position is unforgivable, given that the affected population has not agreed to accept the potential risks.

Response: Incineration has been demonstrated to be the most effective permanent remedy for the destruction of PCBs and has been successfully implemented at other Superfund sites. As part of the design of the incineration component of the selected remedy, EPA will incorporate stringent controls to ensure compliance with all appropriate federal and state requirements.

Risk Assessment

Comment: The risk assessment does not consider potential risks to Canadian citizens. Substantial risk to Canadians will result if incineration, excavation and dredging are implemented.

Response: While the St. Regis Mohawk Tribe was selected as the exposed population for evaluation in the risk assessment, this was done to ensure the most conservative analysis of potential impacts since they are directly adjacent to the Site and have the most direct exposure to Site contamination. EPA however, fully recognizes that Canadian citizens are potentially exposed populations and are concerned about EPA's selected remedial alternative.

EPA has successfully implemented excavation, incineration and dredging at other Superfund sites. These technologies have been demonstrated to be effective in permanently reducing the volume of contaminated material. EPA intends to implement stringent environmental controls to ensure compliance with all appropriate federal and state requirements.

Comment: The risk assessment assumes optimal operation conditions for the incineration facility. The Draft FS states that optimal conditions could not be expected at the Site given the periodic severity of the climate and likelihood of variable feed characteristics.

Response: The evaluation of risks associated with a feasibility study does not require a risk assessment of the same depth as a baseline risk assessment. The assessment conducted for the incineration option is adequate to meet the requirement in this regard. We also point out that numerous full scale risk assessments which have been conducted for hazardous waste incinerators show that the risks from normal operation are far greater than the risks from upset conditions. Therefore, the risks predicted by EPA for normal operations can be used as a benchmark. Published literature which evaluates indirect exposures to incinerator emissions (Chrostowski and Foster 1989) from incineration of dioxin in soils reveals risks below EPA's levels of concern for Superfund sites. These results appear to be applicable to the G.M. Site. Emission control devices on the incinerator are likely to limit metal emissions to negligible levels. Increased volatilization for PCBs will only be a small factor higher than baseline volatilization.

Comment: The risk assessment ignores interactions among carcinogens. Yet, the study admits that the assumption that carcinogens act independently may not be true.

Response: EPA guidance is that carcinogens should be treated in an additive fashion. This is due to the fact that carcinogenic risks

are probabilities. Since the risks from individual chemicals are independent, addition of probabilities is warranted. Additionally, most toxicologists subscribe to the fact that interactions at the extremely low doses potentially experienced by environmental receptors will be biochemically prohibited from interaction.

Comment: The risk assessment did not quantify a number of significant risks referenced in the Draft FS, including:

- anticipated incinerator and/or emission control upsets which may result in emissions of dioxin, furan, hydrochloric acid, sulfuric acid, particulates and others;

- potential downwind deposition of these emissions and the resulting impact to soil, water, cropland, animal grazing and human contact;

- potential emissions of metal from soil materials and fuel combustion; and

- increased volatilization due to sorting/crushing and mixing feed material.

Response: The evaluation of risks associated with a feasibility study does not require a risk assessment of the same depth as a baseline risk assessment. The assessment conducted for the incineration option is adequate to meet the requirement in this regard. We also point out that numerous full scale risk assessments which have been conducted for hazardous waste incinerators show that the risks from normal operation are far greater than the risks from upset conditions. Therefore, the risks predicted by EPA for normal operations can be used as a benchmark. Published literature which evaluates indirect exposures to incinerator emissions (Chrostowski and Foster 1989) from incineration of dioxin in soils reveals risks below EPA's levels of concern for Superfund sites. These results appear to be applicable to the G.M. Site. Emission control devices on the incinerator are likely to limit metal emissions to negligible levels. Increased volatilization for PCBs will only be a small factor higher than baseline volatilization.

PARTI QUEBECOIS BEAUHARNOIS - HUNTINGDON COUNTY

Comment: The officials of Beauharnois-Huntingdon County are concerned that their citizens' health may be impacted by the remedial actions at the Site. They are especially concerned with the following proposed actions: dredging of the St. Lawrence River may threaten the quality of their drinking water; excavation activities may release contaminated dust which would be carried towards the County by prevailing winds; and emissions from incinerators and improperly combusted wastes would also be carried

by prevailing winds into agricultural areas. The Parti Quebecois Beauharnois-Huntingdon County believes that its concerns have not been adequately addressed, and requests active involvement in all future remedial planning, including monitoring of all remedial operations.

Response: EPA has considered the short-term risks associated with Site remediation. The design of any monitoring systems used at the Site will be a joint effort between EPA, New York State, the St. Regis Mohawk Tribe and the Canadian government.

NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC)

Comment: NYSDEC believes that the proposed cleanup level of 2 ppm PCB for the St. Lawrence River sediments will not be protective of human health and the environment and that different remedial options for the sediments should be explored in order to evaluate the technical feasibility of a more stringent cleanup level.

Response: EPA has selected to remediate hot spot areas within the St. Lawrence River to the lowest level that is technically feasible. Hot spot areas have been defined as those with concentrations of PCBs over 1 ppm in the St. Lawrence and Raquette River sediments and 0.1 ppm in Turtle Creek. The St. Lawrence River hot spot definition is based on federal and state sediment quality criteria guidance as well as EPA's risk assessment. The 0.1 ppm hot spot definition for Turtle Creek is based on Tribal regulations. The effectiveness of currently available technology may limit the cleanup level that is practically achievable.

Comment: NYSDEC supports the 10 ppm PCB cleanup level for portions of the G.M. property that have controlled/secured access, but believes that a lower cleanup level could be attained in unsecured areas, especially in areas susceptible to runoff.

Response: EPA has selected a soil/sludge PCB cleanup level of 10 ppm on the G.M. facility. This level is based, in part, on EPA's risk assessment for the alternatives considered for the Site which indicates that 10 ppm is protective of the Indian population and, in part, on EPA guidance which recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to remediated areas will be unlimited to G.M. personnel and because contaminants in on-site soils may impact groundwater and surface water quality. EPA has selected a soil/sludge total phenols cleanup level of 50 ppm based on federal RCRA guidance for closure of surface impoundments. EPA estimates that there are 176,000 cubic yards of soils and sludges in the Industrial Lagoons, in the North Disposal Area, and in other areas on the G.M. facility contaminated with PCBs above 10 ppm which are being addressed in this operable unit.

Comment: NYSDEC believes that the cleanup level for sludge in the industrial lagoons should be at a minimum 10 ppm PCBs and that any lagoons remaining in use should have PCB levels that would not cause contravention of ground water standards should the PCBs leach from the lagoons.

Response: EPA has selected a cleanup level of 10 ppm for the Industrial Lagoons. Inactive lagoons will be remediated when they are taken out of service.

Comment: NYSDEC suggests that a tiered approach, based on concentrations of PCBs, be applied to the methodology for treatment and management of waste materials and residuals. This is in an effort to balance the desire to remove pollutants, apply treatment technologies where feasible and to develop remedial programs which are economically viable. Additionally, NYSDEC believes this approach would allow G.M.'s resources to be used to remove more pollutants from the environment.

Response: EPA has selected a combination of biological treatment (or another innovative treatment technology) and incineration as the selected remedial alternative. Incineration has been demonstrated to be an effective technology for remediating PCB-contaminated soils and sludges. Biological treatment is in innovative technology that shows promise that it can effectively reduce the volume and toxicity of PCB-contaminated materials. To ensure the availability of effective treatment as a component of the remedy, EPA in the ROD stipulates that limited additional treatability studies will be conducted.

Comment: NYSDEC is skeptical as to the viability of bioremediation and believes that other appropriate technologies could be tested concurrently with bioremediation.

Response: Other PCB treatment technologies will be tested concurrently with biological destruction so that EPA will have additional information in the event that biological destruction proves to be unsatisfactory for treatment of any Site material. Biological treatment will be used wherever EPA determines it to be viable. In the event that biological treatment is ineffective for a certain area of the Site or for certain Site materials, other PCB treatment technologies may be employed. The criteria used to judge the treatment technologies during treatability testing include effectiveness and cost.

Industrial Landfill

Comment: NYSDEC believes that sufficient information is available regarding the Industrial Landfill to implement the beginnings of a remedial action plan. NYSDEC suggests the following actions be taken: ground water/leachate collection, containment and

treatment; remediation of the waste pile or portions thereof; and a proper closure of the landfill for any remaining wastes.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill. Groundwater recovery and treatment are included in the first operable unit ROD.

U.S. DEPARTMENT OF COMMERCE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

Comment: EPA's cleanup goal of 2 ppm in the St. Lawrence River may not be fully protective of natural resources. This is especially true in the case of the white whale population which has a tendency to bioaccumulate PCBs. NOAA believes that the 0.1 ppm cleanup goal in the sediments of the Raquette River and Turtle Creek appears to be a more appropriate cleanup goal for the protection of natural resources.

Response: EPA's selected remedy for river sediments requires the delineation of PCB hotspots in the river system. Hotspot areas as defined are then subject to sediment remediation as described below. At this Site, EPA has defined PCB hotspots to be areas with concentrations above 1 ppm in St. Lawrence River and Raquette River sediments and soils and above 0.1 ppm in Turtle Creek sediments and soils.

The 1 ppm PCB cleanup goal in the St. Lawrence and Raquette Rivers was based on interim federal and State sediment quality criteria guidance as well as on EPA's risk assessment. Application of interim federal sediment quality criteria guidance indicates that a PCB cleanup level in sediments should be between 0.08 and 2 ppm. State sediment quality criteria guidance indicates that PCB cleanup levels well below 1 ppm are required to achieve protection of the environment. EPA's risk assessment for the Site demonstrates that a 1 ppm PCB cleanup level in sediment corresponds to a 4×10^{-5} excess cancer risk.

Therefore, in an attempt to minimize residual risks, EPA has selected 1 ppm as a cleanup goal in the St. Lawrence and Raquette Rivers. In selecting the 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers, EPA has also balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers is achievable and provides an acceptable measure of protection to human health.

The 0.1 ppm hotspot definition for Turtle Creek selected by EPA is based on Tribal regulations. This level may not be achievable in all areas due to the technical limitations of dredging as a means of removing sediment.

U.S. DEPARTMENT OF THE INTERIOR (DOI)

Comment: An adequate environmental risk assessment has not been performed to demonstrate that EPA's cleanup level of 2 ppm proposed for the St. Lawrence River sediments will be protective of fish and wildlife. Based on the published data available, the U.S. DOI concludes that a residual sediment level of 2 ppm PCB will pose a threat to fish species that forage significantly in the area of contamination, and also to fish-eating waterfowl, waterbirds and raptors.

Response: In an attempt to minimize residual risks, EPA has selected 1 ppm as a cleanup goal in the St. Lawrence and Raquette Rivers. In selecting the 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers, EPA has also balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers is achievable and provides an acceptable measure of protection to human health.

Comment: The U.S. DOI would like to see information regarding the expected residual levels of PAHs in the St. Lawrence River sediments, and believes that an environmental risk assessment should be performed to determine the potential adverse impacts of any residual PH contamination on the fish and wildlife.

Response: EPA expects that remediation of PCBs in sediments will remove PH contamination in St. Lawrence River sediments.

Comment: The U.S. DOI believes that further characterization of the lower glaciofluvial unit at the Site is needed to determine if the unit is a potential pathway for migration of hazardous substances from the Industrial Landfill.

Response: EPA believes it has sufficient data to select a remedy for Site groundwater. The selected remedy includes groundwater recovery and treatment to prevent off-site migration of contamination.

Comment: The U.S. DOI believes that previous data collected at the Site indicates that PCB contamination may be present in the cove area at the mouth of Turtle Creek, yet the Phase I and Phase II investigations did not sample in this area. Additional sampling should be conducted in and around the cove area to characterize the contamination.

Response: EPA has included the cove area at the mouth of Turtle Creek in the ROD. Hot spots of contaminated sediments in this area will be remediated by dredging and treatment. Based on an ARAR established by the St. Regis Mohawk Tribe, EPA has established a cleanup goal of 0.1 ppm. EPA recognizes that the currently available technologies may preclude remediation to this level. EPA will strive to meet this cleanup goal if technically feasible.

REYNOLDS METALS COMPANY (REYNOLDS)

Cleanup Levels

Comment: Reynolds Metals Company requested additional information on how EPA determined the selected cleanup levels. Additionally, it noted that the cleanup levels across the media are inconsistent and disparate. Further explanation of the cleanup levels followed by a reopening of the public comment period is requested. This should include:

- a discussion of how EPA arrived at the sediment cleanup level of 2 ppm;
- a discussion of how EPA arrived at the 10 ppm cleanup level for PCBs in soils and sludges; and,
- a discussion of how EPA arrived at the 2 ppm cleanup level for Industrial Lagoon sludges.

Response: A complete description of EPA's sediment cleanup levels is given in the ROD decision summary. Reopening of the public comment period is not required for this Site.

Comment: The proposed cleanup level of 10 ppm for PCBs in on-site soils, sludges, and sediments is overly stringent, inconsistent with the EPA PCB Spill Cleanup Policy and inconsistent with cleanup standards used at other similar sites. A cleanup level of 25 ppm is warranted by the EPA PCB Spill Cleanup Policy.

Response: EPA has selected a soil/sludge PCB cleanup level of 10 ppm on the G.M. facility. This level is based, in part, on EPA's risk assessment for the alternatives considered for the Site which indicates that 10 ppm is protective of the Indian population and, in part, on EPA guidance which recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to remediated areas will be unlimited to G.M. personnel and because contaminants in on-site soils may impact groundwater and surface water quality. EPA has selected a soil/sludge total phenols cleanup level of 50 ppm based on federal RCRA guidance for closure of surface impoundments. EPA estimates that there are 176,000 cubic yards of soils and sludges in the Industrial Lagoons, in the North Disposal Area, and in other areas on the G.M. facility

contaminated with PCBs above 10 ppm which are being addressed in this operable unit.

Comment: The proposed cleanup level of 2 ppm for sediment in the St. Lawrence River is overly stringent and inconsistent with cleanup standards used at other similar sites and it also may be technically impossible to achieve. In-place capping would allow for natural biodegradation of the PCB-contaminated sediment at less potential risk than dredging.

Response: The 1 ppm PCB cleanup goal in the St. Lawrence and Raquette Rivers was based on interim federal and state sediment quality criteria guidance as well as on EPA's risk assessment. Application of interim federal sediment quality criteria guidance indicates that a PCB cleanup level in sediments should be between 0.08 and 2 ppm. State sediment quality criteria guidance indicates that PCB cleanup levels well below 1 ppm are required to achieve protection of the environment. EPA's risk assessment for the Site demonstrates that a 1 ppm PCB cleanup level in sediment corresponds to a 4×10^{-5} excess cancer risk.

Therefore, in an attempt to minimize residual risks, EPA has selected 1 ppm as a cleanup goal in the St. Lawrence and Raquette Rivers. In selecting the 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers, EPA has also balanced its desire for a very low cleanup level which will minimize residual risk with the constraints posed by the limitations of dredging as a means of removing sediment. EPA believes that a 1 ppm cleanup goal in the St. Lawrence and Raquette Rivers is achievable and provides an acceptable measure of protection to human health.

EPA has selected a soil/sludge PCB cleanup level of 10 ppm on the G.M. facility. This level is based, in part, on EPA's risk assessment for the alternatives considered for the Site which indicates that 10 ppm is protective of the Indian population and, in part, on EPA guidance which recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to remediated areas will be unlimited to G.M. personnel and because contaminants in on-site soils may impact groundwater and surface water quality.

Comment: The cleanup level for PCBs in all soils and sludge at the Site should be no lower than 25 ppm.

Response: EPA has selected a soil/sludge PCB cleanup level of 10 ppm on the G.M. facility. This level is based, in part, on EPA's risk assessment for the alternatives considered for the Site which indicates that 10 ppm is protective of the Indian population and, in part, on EPA guidance which recommends soil PCB cleanup levels between 10 ppm and 25 ppm in industrial areas. EPA has selected a cleanup level on the lower end of this range because access to

remediated areas will be unlimited to G.M. personnel and because contaminants in on-site soils may impact groundwater and surface water quality.

Comment: The cleanup level of .1 ppb for discharges and ground water is technically infeasible and inconsistent with CERCLA. The method detection limit (MDL) for the waters around the Site is certainly higher than .1 ppb due to the complex nature of those waters. Moreover, EPA has stated on several occasions (e.g., 54 Fed. Reg. at 22100 (May 22, 1989)) that a discharge limit should be set at between 5 and 10 times the applicable MDL.

Response: EPA has selected a cleanup goal of 0.1 ppb for PCBs based on New York State requirements for Class GA aquifers. EPA has also selected cleanup goals for VOCs in compliance with federal and state ARARs. EPA notes that the 0.1 ppb level for PCBs is below the .5 ppb federal MCL. However, under the NCP, EPA is required to remediate to the state requirement if it is more stringent then the federal requirement. Further, EPA recognizes that because PCBs sorb to soil, the effectiveness of PCB removal from ground water may be limited.

Comment: The potential health risks associated with PCB contamination in subsurface soils is lower than those for surface soils because of the greatly reduced likelihood of direct contact and migration through runoff. Thus it may be appropriate to propose lower cleanup standards for subsurface soils. This is consistent with EPA policy.

Response: Recent ground water sampling indicate that low levels of PCBs are present. Based on existing information, EPA believes that the levels of PCB contamination present in soils is contributing, through leaching, to the ground water contamination on the Site. EPA's proposed cleanup level is designed to reduce the amount of PCBs available to leach into the ground water. The proposed cleanup level is clearly within the defined parameters established for industrial sites as outlined in the latest available EPA guidance.

Remedial Alternatives

Comment: The risks posed by several remedial alternatives consistent with CERCLA, other than those preferred by EPA are significantly less than the risks posed by those alternatives preferred by EPA. For example, the risks related to the capping of sediments and allowing for natural biodegradation in the Raquette and St. Lawrence Rivers is significantly less than the risks associated with dredging these sediments. The Proposed Plan does not adequately address these issues.

Response: EPA recognizes that several of the remedial alternatives evaluated pose fewer short-term risks than those remedial

alternatives selected by EPA. After carefully balancing the specific characteristics of the Site against the nine criteria as outlined in the NCP, EPA has determined that the long-term effectiveness, permanence, and protectiveness of public health and the environment afforded by the selected alternatives offset any short-term risks posed by the selected alternative.

Comment: There are logistical and technical difficulties with the incineration of large quantities of soil and debris. EPA should consider other available treatment alternatives like capping and in situ bioremediation. This treatment would be expected to achieve the percentage reduction of PCBs specified in Superfund LDR Guide #6A, "Obtaining a Soil and Debris Treatability Variance for Remedial Actions." This document recognizes biological treatment as a preferred remedial alternative for PCBs and does not require combining alternate treatment technologies when application of one treatment technology will achieve the concentration levels specified from the percentage reduction range.

Response: The Land Disposal Restrictions are not ARARs for this operable unit ROD. In addition, other PCB treatment technologies will be tested concurrently with biological destruction so that EPA will have additional information in the event that biological destruction proves to be unsatisfactory for treatment of any Site material. Biological treatment will be used wherever EPA determines it to be viable. In the event that biological treatment is ineffective for a certain area of the Site or for certain Site materials, other PCB treatment technologies may be employed.

Comment: The potential health risks associated with incineration are unlikely to be acceptable to the neighboring community, including Site neighbors in Canada.

Response: Although EPA has received comment from some U.S. citizens, Canadian citizens, and environmental groups expressing concern and requesting assurances that appropriate safeguards be utilized in implementing the incineration component of the remedy, EPA has received only limited opposition to incineration as a component of the selected remedy. To the contrary, numerous commentors have expressed a preference for the permanence of incineration as a component of the selected remedy as long as stringent controls are implemented. Nevertheless, EPA has reduced the use of incineration in its selected remedy for the Site.

Comment: The contents of the lagoons include PCBs which tend not to migrate in this media. Why has EPA not considered the generally accepted remedy of solidification and closure for the on-site lagoons?

Response: EPA did evaluate solidification and closure of the on-site lagoons in the FS. After careful consideration of the Site's unique characteristics in accordance with the nine criteria as

outlined in the NCP (300.430(e(a)(iii);300.430 (f)(i)(i)), EPA has selected excavation and treatment of the lagoon sludges in the ROD. The combination of these technologies is considered the best balance for the Site.

Other

Comment: An examination of the methods utilized in estimating costs for the alternatives reveals that the actual costs of the alternatives could be dramatically higher than indicated.

Response: As part of the FS, EPA evaluates the relative cost of the various remedial alternatives that are being considered. During the design phase, EPA will further refine and delineate the remediation costs based on the actual parameters of the remedial alternatives selected.

Risk Assessment

Environ, Reynolds Metals Company's consultant, comments on the Gradient Corporation report of April 2, 1990, "Risk Assessment for Five Remedial Alternatives at G.M. Site Massena, New York"

Comment: The remedies preferred by EPA are not those that present the lowest risk. According to Tables 6-1 and 6-2 in the Gradient Corporation report of April 2, 1990, "Risk Assessment for Five Remedial Alternatives at G.M. Site Massena, New York," the greatest estimated increases in risk are associated with the process of excavation and the greatest estimated reductions in risk are associated with the installation of a cap.

Response: EPA recognizes that several of the remedial alternatives put forth by G.M. may pose fewer short-term risks than those remedial alternatives proposed by EPA. However, EPA's "Risk Assessment for Five Remedial Alternatives" indicates that none of the remedial alternatives considered in the FS pose unacceptable short-term risks to human health. (EPA defines unacceptable excess cancer risks as those outside the EPA risk range of 10^{-4} to 10^{-6}. EPA defines unacceptable non-cancer effects as those with a hazard index greater than 1.) Risks to residents of the Reservation can be mitigated through temporary relocation, if necessary. In addition, risks to remediation workers can be mitigated through the use of protective equipment.

EPA also recognizes that there may be impacts associated with incineration and that the public is very concerned about the use of on-site incineration. For this reason, EPA has chosen to minimize the use of on-site incineration in its selected remedy as detailed in the ROD. EPA will rely on the results of treatability tests to determine whether biological treatment (or another innovative technology) or incineration will be used to treat the various areas at the Site. In the event that biological treatment

is ineffective for a certain area of the Site, other treatment technologies which will be tested concurrently with biological treatment may be employed. In the event that other technologies are ineffective, incineration will be used at the Site.

After carefully balancing the specific characteristics of the Site against the nine criteria as outlined in the NCP, EPA has determined that the long-term effectiveness and permanence afforded by the selected alternative offset any short-term risks posed by the selected alternative and the higher costs of the selected remedy.

Comment: The vast amount of experience with PCBs and other hydrophobic chemicals at other sites indicates that a cap often substantially reduces exposure to (and hence risk from) PCB-contaminated soils without a substantial increase in risk during remediation. Capping alone should have been considered for PCB-contaminated sediments.

Response: Capping was considered by EPA. However, after carefully balancing the specific characteristics of the Site against the nine criteria as outlined in the NCP, EPA has determined that the long-term effectiveness and permanence afforded by the selected alternative offset any short-term risks posed by the selected alternative and the higher costs of the selected remedy.

Comment: The worst case scenarios used in the risk assessment combine many worst-case assumptions and may generate "risk" that is so extreme that it is unrealistic and not applicable to any one individual. While the worst case estimate appears to be properly characterized, the "most probable case scenario" was only adjusted for average concentrations in media but not average exposures.

Response: This document was conducted in accordance with EPA Risk Assessment Guidance for Superfund and the NCP using the concept of a reasonable maximum exposure (RME). The RME is defined as the highest exposure that is reasonably expected to occur at a site. The intent of the RME is to estimate a <u>conservative</u> exposure case (i.e. well above the average case) that is still within the range of <u>possible</u> exposures.

Comment: The soil parameters assumed in the risk assessment for purposes of modeling PCB volatilization are inconsistent and unrealistically conservative.

Response: The PCB volatilization model is consistent with EPA's Development of Advisory Levels for Polychlorinated Biphenyls (PCBs) Cleanup.

Comment: The estimates of volatilization rates do not reflect recent scientific literature regarding physical/chemical parameters

for PCBs and, thus, provide estimates of volatilization that are likely to overestimate actual volatilization.

Response: The PCB volatilization model is consistent with EPA's Development of Advisory Levels for Polychlorinated Biphenyls (PCBs) Cleanup.

Comment: Some of the data and assumptions used to estimate systemic dose are more conservative than usually used by EPA and are not warranted based on available data.

Response: The factors used to estimate dose in the risk assessment are consistent with EPA guidance(Superfund Exposure Assessment Manual, Exposure Factors Handbook) and general practice at Superfund sites elsewhere.

Comment: Although the risk assessment assumes that congeners of PCDDs and PCDFs have different carcinogenic potencies, the same carcinogenic potency was assumed for all PCBs. The possibility for a threshold for the carcinogenic effects of all PCDDs, PCDFs, and PCBs should be discussed, as should the effect of such an assumption on the estimated risks.

Response: EPA's cancer policy is based on linear low-dose response in the absence of a scientifically demonstrated threshold. This is the cause for chemicals of concern in this assessment.

Industrial Landfill

Comment: EPA should strongly consider capping the landfill. This is consistent with the most recent revisions to the NCP which recognizes that treatment of large landfills is not a feasible alternative.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

ALUMINUM COMPANY OF AMERICA (ALCOA)

Remedial Alternatives

Comment: EPA's "Draft Guidance on Selecting Remedies for Superfund sites with PCB Contamination" asserts that there are three primary options for non-liquid PCBs at concentrations of 50 ppm or greater: incineration, treatment equivalent to incineration, and disposal in a chemical waste landfill. There is no separate consideration

given to PCBs at concentrations greater than 500 ppm. Why, then, were other innovative alternatives like bioremediation not considered? This would be consistent with EPA's policy of utilizing innovative techniques.

Response: Other PCB treatment technologies will be tested concurrently with biological destruction so that EPA will have additional information in the event that biological destruction proves to be unsatisfactory for treatment of any Site material. Biological treatment will be used wherever EPA determines it to be viable. In the event that biological treatment is ineffective for a certain area of the Site or for certain Site materials, other PCB treatment technologies may be employed.

Cleanup Levels

Comment: The St. Regis Mohawk Tribe ARARs are admirable goals, but may not be technically achievable and place an unwarranted burden on General Motors.

Response: The St. Regis Mohawk Tribe has the authority under CERCLA to establish ARARs for tribal properties. EPA recognizes and supports these ARARs at the Site. However, based on limited previous experience at other Superfund sites and federal projects, sediment dredging to 0.1 ppm PCBs may be technically impracticable. Therefore, during sediment dredging in Turtle Creek, EPA will attempt to meet the Tribal ARAR of 0.1 ppm PCBs. Where it is technically impracticable to achieve the Tribal sediment standard, EPA will need to waive this ARAR.

Industrial Landfill

Comment: The proposed excavation of the Industrial Landfill is inappropriate. Excavation of the landfill will increase estimated cancer risks in both the long and short terms because of difficulties in implementing this alternative. A synthetic composite cap represents a better remedial alternative. Considering this, the expenditure of nearly $200,000,000 for excavation seems unwarranted.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

Comment: A waiver of ARARs for the Industrial Landfill is appropriate when one considers that the current risks posed by the landfill are within accepted EPA guidelines.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

Comment: ALCOA recommends that a synthetic composite cap and ground water collection and treatment be utilized for the Industrial Landfill. EPA's baseline risk assessment reveals a plausible upper bound estimated cancer risk for this Site that is well within EPA's acceptable criteria. Additionally, EPA's "Draft Guidance on Selecting Remedies for Superfund Sites with PCB Contamination" allows landfill closure as an acceptable alternative to excavation and treatment. This approach takes into account the anticipated use of the Site once the alternative is implemented.

Response: EPA has deferred selection of a remedial alternative for the Industrial Landfill and the East Disposal Area to reevaluate Industrial Landfill and East Disposal Area data, better factor community concerns into its decision-making process for the Industrial Landfill, and evaluate the impact of new federal guidance on Superfund sites which are contaminated with PCBs. EPA will consider this comment when developing a Proposed Plan for the Industrial Landfill.

V. REMAINING CONCERNS

Concerns raised by the community regarding remedial action and design activities at the Site will continue to be important community issues throughout the remedial design phase.

Interest by the St. Regis Mohawk Reservation which abuts the Site, Canadian citizens and local U.S. residents, especially G.M. workers, is likely to continue at the already high level and may increase even further once remedial design activities begin. Area residents should be kept fully informed of the status of remedial activities throughout this phase in order to dispel public concern. Suggestions by several interested citizens about EPA coordinating with a Citizens Advisory Group should be considered during the remedial design and second operable unit RI/FS.

APPENDIX A

EPA'S PROPOSED PLAN

General Motors Corporation
Central Foundry Division

St. Lawrence County, Massena, New York

EPA

ANNOUNCEMENT OF THE PROPOSED PLAN

This Proposed Plan identifies the U.S. Environmental Protection Agency's (EPA's) preferred option for cleaning up the contaminated soils, lagoon sludges, river sediments, wetlands, and groundwater associated with the General Motors Corporation - Central Foundry Division ("G.M.") Superfund Site (the "Site") located in St. Lawrence County, Massena, New York. In addition, the Plan includes summaries of other alternatives which could be used to remediate the Industrial Landfill at the Site.

COMMUNITY ROLE IN THE SELECTION PROCESS

The Proposed Plan is being distributed to solicit public comment regarding EPA's preferred option as well as the other alternatives which could be used to clean up the Site. In addition, EPA is soliciting comment on alternatives presented for cleaning up the Industrial Landfill at the Site. At this time, EPA has not specified a preferred alternative for the Industrial Landfill. The public comment period will begin on March 21, 1990 and continues until May 21, 1990.

EPA, in consultation with the New York State Department of Environmental Conservation ("NYSDEC") and the St. Regis Mohawk Tribe, will select a remedy for the Site only after the public comment period has ended and the information submitted during this time has been reviewed and considered.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Detailed information on all of the material discussed here may be found in the November 1989 Feasibility Study (FS) report and other documents contained in the administrative record file for this Site. These documents, including the Remedial Investigations (RIs) and the Baseline Risk Assessments, are available at the following locations:

U.S. Environmental Protection Agency
Region II Office
26 Federal Plaza, Room 747
New York, New York 10278

St. Regis Mohawk Indian Reservation
Community Building
Hogansburg, New York 13655

Massena Public Library
14 Glenn Street
Massena, New York 13662

EPA, in consultation with the NYSDEC and the St. Regis Mohawk Tribe, may modify the preferred alternative or select another response action presented in this Plan and the FS report based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives identified here.

Written comments can be sent to:

Lisa Carson
Project Manager
U.S. Environmental
Protection Agency
26 Federal Plaza, Room 747
New York, New York 10278

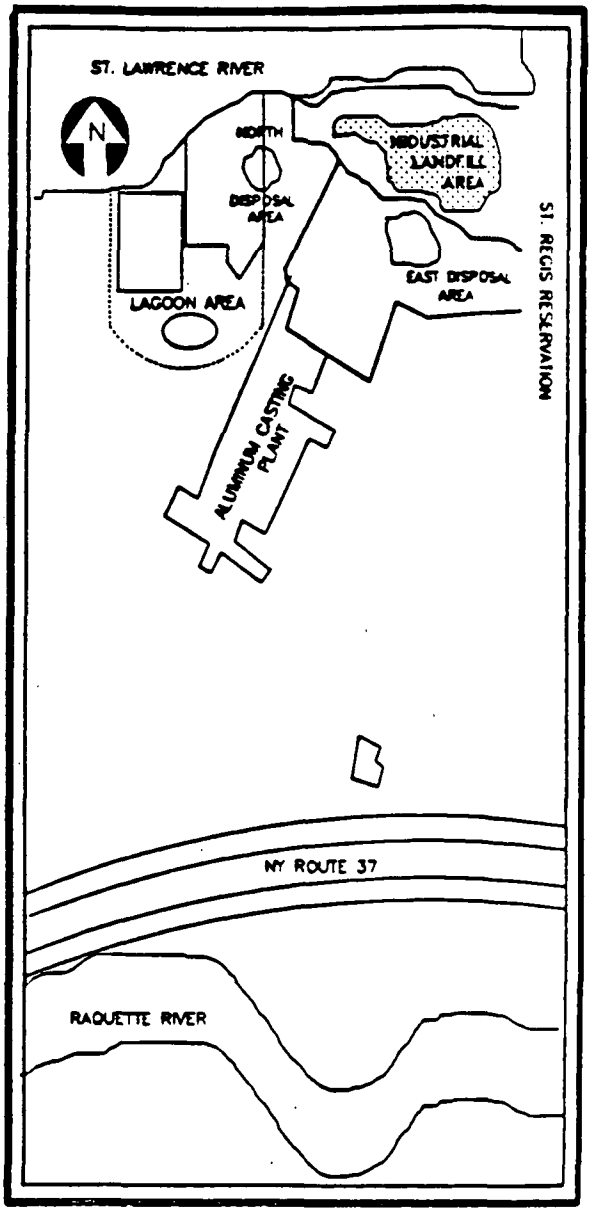
EPA will hold a public meeting at 7:30 p.m. on April 25, 1990 at the St. Regis Mohawk School in Hogansburg, New York. EPA will present the findings of the FS and the preferred remedy for the Site. All interested persons are encouraged to attend to ask questions and provide comments.

SITE HISTORY

The Site which includes an active General Motors manufacturing plant is located in Massena, New York, in St. Lawrence County. The G.M. facility is bordered on the north by the St. Lawrence River, on the east by the St. Regis Mohawk Indian Reservation, on the south by the Raquette River and on the west by the Reynolds Metals Company and property owned by Conrail. G.M. has operated an aluminum casting plant at the Site since 1959.

From 1968 to 1980, polychlorinated biphenyls ("PCBs") were a component of the hydraulic fluids used in the diecasting machines. PCBs provided protection against fire and thermal degradation in the high temperature environment of the diecasting machines. G.M. periodically landfilled

SITE LOCATION MAP



sludges containing PCBs and other hazardous substances in on-site disposal pits. The Site consists of several areas.

The North and East Disposal Areas and the Industrial Landfill contain soil, debris, and sludge. The Four Industrial Lagoons contain 350,000 gallons, 500,000 gallons, 1.5 million gallons and 10 million gallons of liquids, sludges, and solids. The

Site also includes contaminated sediments and associated wetlands of the St. Lawrence River, the Raquette River and Turtle Creek (formerly called the unnamed tributary on the St. Regis Mohawk Reservation), contaminated soil on the St. Regis Mohawk Indian Reservation and on the banks of the St. Lawrence and Raquette Rivers, contaminated soil on G.M. property not associated with the specific disposal areas already mentioned, and contaminated groundwater associated with the Site. As a gross estimate, the Site contains approximately 823,000 cubic yards (approximately equal to 823,000 tons) of material contaminated with PCBs at concentrations above ten parts per million (ppm).

The Site was placed on the Superfund National Priorities List ("NPL") in September 1983 as a result of G.M.'s past waste disposal practices. G.M. indicated a willingness to perform the Remedial Investigation and Feasibility Study (RI/FS) for the Site. On April 16, 1985, EPA and G.M. entered into an Administrative Order on Consent (Index No. II CERCLA-50201) for G.M.'s performance of the RI/FS. Phase I and Phase II RI reports were submitted to EPA in May 1986 and May 1988, respectively.

G.M. performed additional river sampling in February 1989, and submitted a report on the additional sampling to EPA in May 1989. On June 9, 1989, EPA approved the RI report, which consists of the draft RI report, the Phase II RI report and the sediment sampling report, for the Site. The RI report delineated those areas in need of remediation throughout the Site. G.M. submitted the FS report to EPA in November 1989.

SCOPE OF THE RESPONSE ACTION

The FS for the Site focuses on reviewing and evaluating alternative methods for remediating all of the contaminated areas at the Site. The overall objective of the cleanup is to reduce the PCB and other contaminant concentrations to levels protective of human health and the environment.

SUMMARY OF SITE RISKS

EPA and G.M.'s consultant conducted independent analyses to estimate the health problems that could result if the contamination at the G.M. Massena Site were not cleaned up. This analysis is referred to as a baseline risk assessment.

The RI reports show that there are four major contaminants at the Site - PCBs, polyaromatic hydrocarbons (PAHs), phenols and volatile organic compounds (VOCs). At the G.M. Site, PAHs, phenols, and VOCs were found at much lower concentrations and in fewer samples than PCBs. Therefore, the primary contaminant of concern at the Site is PCBs and PCBs were used by EPA in developing its baseline risk assessment. Although this Proposed Plan focuses on PCBs, the other major contaminants at the Site will also be addressed during the cleanup of the Site.

In conducting the risk assessment, the focus was on the health effects that could result from ingestion of fish and wildlife containing PCBs, direct ingestion of and contact with PCB contaminated soils, and ingestion of surface water. The exposed populations include the residents of the St. Regis Mohawk Indian Reservation and workers at the Site.

PCBs tend to accumulate in human and animal tissue and are classified by EPA as probable human cancer causers. The major organs affected by PCBs are the liver and the skin. PCBs have produced liver tumors in laboratory studies of rats. In addition, PCBs cause harmful reproductive effects in certain animals at low levels and may cause similar results in humans.

EPA's baseline endangerment assessment for the Site indicates that the most significant public health risk is from ingestion of fish and wildlife which have been exposed to PCB contaminated sediments and soils. These risks are on the order of 2×10^{-2}, which indicates that, as a plausible upper bound, an individual has a two in one hundred chance of developing cancer as a result of fish or wildlife-related exposure to PCBs. Risks

from contact with and ingestion of PCB contaminated soil were on the order of 1×10^{-6}, which is a one in one million chance of developing cancer. EPA considers risks in the range 10^{-4} to 10^{-6} to be generally acceptable; risks from fish and wildlife ingestion are not within this range. Ingestion of fish and wildlife also posed much higher risks for non-cancer effects than did other exposure pathways.

Stated another way, PCB contaminated sediments and soils which are eaten by fish and wildlife pose the greatest threat to human health at the Site, while direct human contact with PCB contaminated soils poses a much lower risk to health. Thus, actual or threatened releases of hazardous substances from this Site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare, or the environment.

CLEANUP LEVELS FOR THE SITE

EPA has chosen cleanup levels for PCBs and other chemicals at this Site based on a number of factors. They include requirements of federal and State laws and regulations and requirements of the St. Regis Mohawk Tribe for Reservation lands. The levels are chosen to be protective of human health and the environment, and vary according to where the contamination occurs.

The cleanup level chosen for PCBs in St. Lawrence river sediments is 2 ppm, based on federal guidance. The cleanup goal chosen for sediments in the Raquette River and Turtle Creek is 0.1 ppm PCBs, based on Tribal requirements. The cleanup level for soil and sludges on G.M. property is 10 ppm PCBs, based on federal and State policies. The cleanup level for soils on the Reservation is 1 ppm PCBs, based on Tribal requirements. Groundwater will be treated to 0.1 parts per billion (ppb) PCBs, based on State requirements. Other contaminants in groundwater will be treated to levels which comply with federal and State requirements.

SOIL, SLUDGE, AND SEDIMENT TREATMENT TECHNOLOGIES EVALUATED FOR THE G.M. SITE

The FS identified several technologies which could be used to treat PCBs and other contaminants in soils, sludges and sediments in the various areas at the Site.

Six methods of treatment for soils, sludges and sediments were examined: biological destruction, chemical destruction, chemical extraction, thermal destruction (incineration), thermal extraction and solidification. Each of these treatment technologies has been tested at other hazardous waste sites. Although some have been found to be effective in treating PCBs, each technology, with the exception of thermal destruction, would require a pilot or field testing program before full-scale use at this Site. Thermal destruction would require trial incinerator burns to assure correct operating conditions.

Biological destruction of PCBs using scientifically engineered bacteria was examined and found to be a feasible alternative for the remediation of contaminated soils, sediments, and sludges. The most likely biological treatment would involve processing in above-ground tanks. Bacteria and nutrients are added to the tanks along with waste. If successful, biological treatment changes PCBs to less toxic materials, including carbon dioxide and water. Biological treatment is not thought to be an effective treatment method for materials with PCB concentrations greater than 500 ppm.

Chemical destruction uses the KPEG chemical dechlorination process. In this process, PCB-contaminated materials are reacted with potassium polyethylene glycol, or KPEG, to alter the molecular structure of the PCBs.

Chemical extraction using the B.E.S.T. (Basic Extractive Sludge Treatment) process was also evaluated. This technology involves concentrating large volumes of PCBs into smaller volumes of an

oily extract. The extract must then be disposed. The B.E.S.T. process utilizes triethylamine, a solvent, to extract PCBs from the solids.

The thermal destruction alternative involves the incineration of excavated and dredged material. One type of incinerator that has been used at other hazardous waste sites is the rotary kiln incinerator.

Thermal extraction of the excavated solids is another treatment technology applicable to the Site. This technology involves the removal of organics from a solid waste stream under lower temperature conditions than those of incineration. The organic contaminants are not destroyed during this extraction process; rather another treatment process would be necessary to permanently destroy the organic material.

Solidification, or chemical fixation, of the excavated material involves the physical encapsulation, chemical reaction, or both, of the excavated material. A commercially available additive is mixed with the waste to create a solid material. This solid material can then be disposed. Solidification would serve to limit the leachability, or "leaking", of the PCBs into the environment.

The treatment options discussed above can be used separately or in combination with each other to treat soils, sludges and sediments at the Site. For example, EPA has evaluated a mixed treatment alternative which involves incineration of only those solids contaminated with PCBs over 500 ppm and biological treatment of solids below 500 ppm.

After treatment by any of the above methods, the treated material (including soils, sediments, and sludges) would be backfilled into the excavated areas located on the G.M. property. Those soils excavated from the St. Regis Reservation and river sediments would also be backfilled on the G.M. property following treatment. The excavated areas on the St. Regis Reservation would be restored to their original condition using clean fill, if necessary.

SUMMARY OF REMEDIAL ALTERNATIVES

The remedial alternatives are presented by area of the Site which they address. In addition to treatment technologies, the FS also addressed a "no action" alternative, containment technologies, and groundwater alternatives which are discussed below.

AREA 1: CONTAMINATED RIVER AND TRIBUTARY SEDIMENTS

Approximately 50,000 cubic yards of contaminated river sediments with PCB concentrations above 2 ppm are located in the St. Lawrence River, Raquette River and Turtle Creek. The three surface water bodies are collectively referred to as the river system. Some of these sediments lie in wetland areas along the river system. The highest PCB concentration detected in the river sediments is 5,700 ppm.

The possible remedial alternatives for the river system include: no action, in-place containment of the river sediments, and dredging of sediments with on-site treatment (using one of the technologies outlined above).

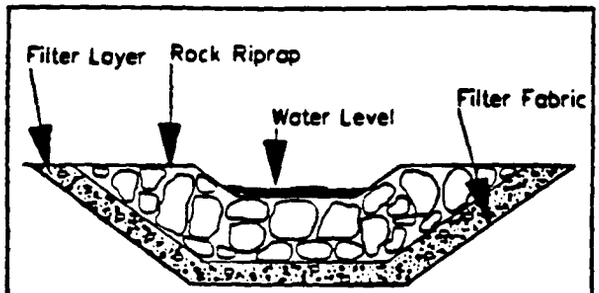
No Action for the River Sediments

CERCLA requires that the "no action" alternative be considered at Superfund sites. This alternative consists of allowing the contaminated river sediments and wetlands to remain in their present state in the river system.

In-Place Containment of River Sediments

This alternative (also called in-situ containment) consists of the placement of a graded aggregate cover over the contaminated river sediments (see figure). Annual inspections to determine the cover's effectiveness in containing the PCBs and other hazardous substances and preventing the

movement of these hazardous substances into the water column would be performed. This alternative also provides for the necessary maintenance of the cover.



In-Situ Containment of River Sediments

Sediment Dredging and On-Site Treatment

This alternative involves dredging the contaminated sediments in the river system and wetlands. Prior to remediation, a silt curtain would be installed to minimize resuspension of sediment during dredging activities. In addition, a sheet pile wall would be installed on the river side of the dredging area to serve as the primary sediment control device.

After dredging, the material would be treated on-site using one or a combination of the six treatment methods described above. Any water resulting from the dredging process would be treated in an appropriate wastewater treatment system. The treated sediments would be backfilled into areas located on the G.M. property. The silt curtain and sheet pile wall would be removed after completion of the dredging operation and the riverbed, riverbanks, and wetlands restored.

COST ANALYSIS OF REMEDIAL ALTERNATIVES

AREA 1: CONTAMINATED RIVER AND TRIBUTARY SEDIMENTS

	Construction* Cost ($M)	Annual Operation** & Maintenance ($K/yr)	Total Present Worth ($M)
No Action	60($K)	127	1.2
Containment	3.3	30	3.6
Dredging and Treatment			
Biological Treatment	7.7	12	7.7
Chemical Destruction	29	12	29
Chemical Extraction	22	12	22
Thermal Destruction	32	12	32
Biological Treatment of Sediments with PCBs Concentrations Between 2 ppm and 500 ppm and Thermal Destruction of Sediments with PCB Concentrations Greater than 500 ppm	21.5	24	21.5
Thermal Extraction	29	12	29
Solidification	17	12	17

* Capital costs include fixed costs (costs associated with equipment mobilization and site preparation) and non-fixed costs (costs associated with treatment of a specific disposal area).

** Power costs for treatment alternatives have been included as capital costs.

AREA 2: NORTH AND EAST DISPOSAL AREAS, CONTAMINATED SOILS ON THE ST. REGIS MOHAWK RESERVATION, CONTAMINATED SOILS ON G.M. PROPERTY

The North and East Disposal Areas consist of approximately 225,000 cubic yards of soils, debris and sludges with PCB concentrations greater than 10 ppm. The highest PCB concentrations detected in the North and East areas are 31,000 ppm and 41,000 ppm, respectively. The maximum phenol concentration detected in the East area is 11,000 ppm. There are approximately 15,000 cubic yards of soil on the Mohawk Indian Reservation contaminated with PCBs at concentrations above 1 ppm. The highest PCB concentration detected on the Reservation is 48 ppm. There are also approximately 40,000 cubic yards of soil in various areas on the G.M. property which are contaminated with PCBs at concentrations greater than 10 ppm. This includes soils in the area adjacent to the Raquette River as well as other areas on the G.M. property.

The following alternatives apply to the contaminated material in these areas: no action, capping, solids excavation and on-site treatment (using one of the alternatives outlined above), and excavation of the material with on-site disposal.

No Action for the North and East Disposal Areas, Reservation Soils and Soils on G.M. Property

CERCLA requires that the "no action" alternative be considered at Superfund Sites. The North and East Disposal Areas would not receive additional waste materials; however, no remediation would occur at any of these areas under this alternative.

Capping of the North and East Disposal Areas, Reservation Soils, and Soils on G.M. Property

This alternative has been subdivided into two potential capping methods: a soil cover and a synthetic composite cover. The soil cover alternative involves excavating the contaminated soils on the St. Regis Mohawk Reservation and the contaminated soils adjacent to the Raquette River and in other areas on the G.M. property and consolidating these excavated materials within the East Disposal Area. The North and East Disposal Areas would then be graded to provide surface drainage, compacted and covered with one layer of a synthetic material known as geotextile, two feet of clay and six inches of topsoil. Revegetation of the area and groundwater monitoring would complete the remediation.

The composite cover alternative also consists of excavating the contaminated soils on the St. Regis Mohawk Reservation and the contaminated soils adjacent to the Raquette River and in other areas on the G.M. property and consolidating these excavated materials within the East Disposal Area. Grading and compaction of the North and East Disposal Areas would then be performed. The North and East Disposal Areas would then be capped using the following materials: three feet of clay, one layer of flexible membrane liner, one layer of drainage material, one layer of geotextile, eighteen inches of rooting zone soil and six inches of topsoil. Revegetation of the North and East Disposal Areas and groundwater monitoring would complete the remediation.

Excavation and On-Site Treatment of Solids in the North and East Disposal Areas, Reservation Soils, and Soils on G.M. Property

This alternative consists of excavating the contaminated soils, debris and sludges in the North and East Disposal Areas, on the Reservation, and on the G.M. property and treating them with one or a combination of the six treatment methods discussed above. The treated material would then be backfilled into excavated areas located on the G.M. property. The excavated areas on the Reservation would be restored with clean fill.

Excavation and On-Site Disposal of Solids in the North and East Disposal Areas, Reservation Soils, and Soils on the G.M. Property

This alternative consists of excavation of contaminated soils, debris and sludges in the North and East Disposal Areas, on the Reservation, and on the G.M. property followed by placement of these materials in an on-site landfill located on G.M.'s property. The excavated areas on the Reservation would be restored with clean fill. Long-term monitoring of the disposal area would be performed.

COST ANALYSIS OF REMEDIAL ALTERNATIVES

AREA 2: NORTH AND EAST DISPOSAL AREAS, CONTAMINATED SOILS ON THE ST. REGIS MOHAWK RESERVATION, CONTAMINATED SOILS ON G.M. PROPERTY

	Construction* Cost ($M)	Annual Operation** & Maintenance ($K/yr)	Total Present Worth ($M)
Capping			
Soil Cover	4.4	185	6.1
Composite Cover	6.8	185	8.5
Solids Excavation and Treatment			
Biological Treatment	45	102	45
Chemical Destruction	118	165	118
Chemical Extraction	85	165	85
Thermal Destruction	136	165	136
Biological Treatment of Solids with PCB Concentrations Below 500 ppm and Thermal Destruction of Solids with PCB Concentrations Greater than 500 ppm	86	267	87
Thermal Extraction	118	165	118
Solidification	60	165	60
On-Site Disposal	29	192	31

* Capital costs include fixed costs (costs associated with equipment mobilization and site preparation) and non-fixed costs (costs associated with treatment of a specific disposal area).

** Power costs for treatment alternatives have been included as capital costs.

AREA 3: INDUSTRIAL LANDFILL

Approximately 424,000 cubic yards of soil, debris and sludges contaminated with PCBs at concentrations above 10 ppm are located in this area. The highest PCB concentration detected in the Industrial Landfill is 4,300 ppm. No action, capping, solids excavation and on-site treatment (using one of the alternatives outlined above), and excavation of the landfill with subsequent redisposal in an on-site disposal area are potential remedial alternatives for this area.

No Action for the Industrial Landfill

CERCLA requires that the "no action" alternative be considered at Superfund sites. The interim cover already installed on the Industrial Landfill by G.M., at EPA's and New York State's request, would remain in place, with no upgrading performed.

Capping of the Industrial Landfill

This alternative has been subdivided into two potential methods of containment: a soil cover and a synthetic composite cover. Under the soil cover option, the Industrial Landfill would be graded, compacted and covered with one layer of a synthetic material known as geotextile, two feet of clay and six inches of topsoil. Revegetation of the area would complete the remediation.

The composite cover alternative also includes grading and compaction of the Industrial Landfill. The Industrial Landfill would then be capped using the following materials: three feet of clay, one layer of flexible membrane liner, one layer drainage material, one layer geotextile, eighteen inches of rooting zone soil and six inches of topsoil. Revegetation of the Industrial Landfill and groundwater monitoring would complete the remediation.

Industrial Landfill Solids Excavation and On-Site Treatment

This alternative consists of excavating the contaminated soils, debris and sludges in the Industrial Landfill and treating them with one of the six treatment methods discussed above. The treated material would then be backfilled into excavated areas located on the G.M. property.

Industrial Landfill Solids Excavation with On-Site Disposal

This alternative consists of excavation of contaminated soil, debris and sludges in the Industrial Landfill followed by placement of these materials in an on-site engineered landfill located on G.M.'s property. Long-term monitoring would be performed.

COST ANALYSIS OF REMEDIAL ALTERNATIVES

AREA 3: INDUSTRIAL LANDFILL

	Construction* Cost ($M)	Annual Operation** & Maintenance ($K/yr)	Total Present Worth ($M)
Capping			
Soil cover	1.3	185	3
Composite cover	3.5	185	5.2
Solids Excavation and Treatment			
Biological Treatment	61	102	61
Chemical Destruction	176	165	177
Chemical Extraction	125	165	126
Thermal Destruction	202	165	203
Biological Treatment of Solids with PCB Concentrations Between 10 ppm and 500 ppm and Thermal Destruction of Solids with PCB Concentrations Greater than 500 ppm	179	267	180
Thermal Extraction	176	165	177
Solidification	87	165	88
On-Site Disposal	32	192	34

* Capital costs include fixed costs (costs associated with equipment mobilization and site preparation) and non-fixed costs (costs associated with treatment of a specific disposal area).

** Power costs for treatment alternatives have been included as capital costs.

AREA 4: INDUSTRIAL LAGOONS

The sludges contained in the four lagoons (350,000 gallon, 500,000 gallon, 1.5 million gallon and 10 million gallon) may be remediated by one of the following remedial alternatives: no action, solids and sludge excavation and on-site treatment (using one of the treatment alternatives outlined above) and solids and sludge excavation with disposal in an on-site disposal area. The lagoons contain approximately 91,000 cubic yards of sludges and soils contaminated with PCBs at concentrations above 10 ppm, primarily in the 350,000 gallon lagoon. The highest PCB concentration detected in the lagoons is 750 ppm, while the highest phenol concentration detected is 26,000 ppm. VOCs and metals were also detected at levels above background, primarily in the 350,000 gallon lagoon.

No Action for the Lagoons

CERCLA requires that the "no action" alternative be considered at Superfund sites. The 500,000 gallon and 10 million gallon lagoons would continue to function as part of G.M.'s wastewater treatment system, but no remediation would occur. The 1,500,000 gallon and 350,000 gallon lagoons would remain inactive and would not receive additional waste materials; however, no remediation would occur at the lagoons.

Lagoon Solids Excavation and On-Site Treatment

This alternative consists of excavating the contaminated solids, including underlying soil, and sludges in the lagoons and treating them with one of the six treatment methods discussed above. Prior to excavation, liquids in the lagoons would be removed, treated and discharged. The treated material would then be backfilled into excavated areas located on the G.M. property.

Lagoon Solids Excavation with On-Site Disposal

This alternative consists of excavation of contaminated solids, including underlying soils and sludges in the four lagoons, followed by placement of these materials in an on-site landfill located on G.M.'s property. Prior to excavation, liquids in the lagoons would be removed, treated and discharged. The excavated areas would be backfilled if needed. Long-term monitoring of the groundwater would be performed.

COST ANALYSIS OF REMEDIAL ALTERNATIVES

AREA 4: INDUSTRIAL LAGOONS

	Construction* Cost ($M)	Annual Operation** & Maintenance ($K/yr)	Total Present Worth ($M)
Solids and Sludge Excavation and Treatment			
Biological Treatment	24	102	24
Chemical Destruction	42	165	42
Chemical Extraction	31	165	31
Thermal Destruction	47***	165	47
Biological Treatment of Solids and Sludges with PCB Concentrations Between 10 ppm and 500 ppm and Thermal Destruction of Solids and Sludges with PCB Concentrations Greater than 500 ppm	47***	267	48
Thermal Extraction	42	165	42
Solidification	22	165	22
On-Site Disposal	21	192	23

* Capital costs include fixed costs (costs associated with equipment mobilization and site preparation) and non-fixed costs (costs associated with treatment of a specific disposal area).

** Power costs for treatment alternatives have been included as capital costs.

*** See cost discussion on page 19 for further explaination of these costs.

AREA 5: GROUNDWATER

PCBs were detected at concentrations up to 1.3 ppm in groundwater associated with the Site. VOCs were also detected in some groundwater samples. The highest levels of PCB contamination were detected in samples of groundwater associated with the Industrial Landfill. Groundwater from the Site discharges to the St. Lawrence River. Groundwater may be remediated by one of the following remedial alternatives: no action, containment of the groundwater and extraction and treatment of contaminated groundwater.

No Action for Groundwater

CERCLA requires that the "no action" alternative be considered at Superfund sites. No groundwater remediation would occur; however, groundwater monitoring for a 30-year period would be performed. Groundwater monitoring costs are included in the cost estimates for the no action alternative.

Groundwater Containment

A subsurface slurry wall consisting of either a soil/bentonite mixture or a cement/bentonite mixture would be constructed to a depth sufficient to achieve a hydrologic barrier. The slurry wall would be located hydrologically downgradient of the Site to prevent the flow of groundwater from the Site to the St. Lawrence River and the St. Regis Mohawk Indian Reservation. Observation wells would be placed inside and outside of the slurry wall's perimeter to detect possible infiltration and determine the integrity of the slurry wall. Pumping wells would also be installed on the G.M. side of the slurry wall to control the flow of groundwater. The water from the pumping wells would be treated in a wastewater treatment system, with discharge to the St. Lawrence River.

Groundwater Recovery and Treatment

This alternative involves the construction of extraction wells or trenches located hydrologically downgradient of the Site on G.M. property. The contaminated groundwater would be extracted from the aquifer and pumped to a wastewater treatment plant for treatment by a combination of air stripping to remove the volatile organic compounds and carbon adsorption to remove PCBs from the groundwater. After treatment, the water would be discharged to the St. Lawrence River.

COST ANALYSIS OF REMEDIAL ALTERNATIVES

AREA 5: GROUNDWATER

	Construction* Cost ($M)	Annual Operation** & Maintenance ($K/yr)	Total Present Worth ($M)
Groundwater Containment	6	167	7.6
Groundwater Recovery and Treatment	2	197	4

* Capital costs include fixed costs (costs associated with equipment mobilization and site preparation) and non-fixed costs (costs associated with treatment of a specific disposal area).

** Power costs for treatment alternatives have been included as capital costs.

EVALUATION OF ALTERNATIVES

Nine criteria were used to evaluate the remedial alternatives. The criteria are described below. The first two criteria, protection of human health and the environment and compliance with applicable or relevant and appropriate requirements are considered by EPA to be threshold criteria which must be met by each alternative.

Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements (ARARs) of federal, Tribal and State environmental statutes and/or provides a basis for an ARAR waiver.

Long-term effectiveness refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

Reduction of toxicity, mobility or volume addresses the performance of the remedy in terms of using treatment to reduce the toxicity, mobility, or volume of the contaminants of concern in the environment.

Short-term effectiveness addresses the period of time needed to achieve protection, and any adverse impacts on human health that may be posed during the construction and implementation period until cleanup goals are achieved.

Implementability refers to the technical and administrative feasibility of implementing a remedy, including the availability of materials and services required to implement a particular option.

Cost includes estimated capital and operation and maintenance costs of the remedy, and the net present worth cost of the alternatives.

State and Tribe acceptance indicates whether, based on their review of the RI/FS and Proposed Plan, the State and Tribe concur with, oppose, or have no comment on the preferred alternative at the present time.

Community acceptance will be assessed in the Record of Decision following a review of the public comments received on the RI/FS report and the Proposed Plan.

EPA'S PREFERRED ALTERNATIVES

EPA's preferred alternative includes a combination of treatment methods for the various areas of the Site.

AREA 1: CONTAMINATED RIVER AND TRIBUTARY SEDIMENTS

The preferred remedial alternative for the river system is dredging of the sediments with on-site treatment. The cleanup level for PCBs in sediments in the St. Lawrence River will be 2 ppm. This cleanup level is based on EPA's draft sediment quality criteria document as well as on an estimation of residual risks from sediments at 2 ppm. The cleanup goal for sediments in the Raquette River and in Turtle Creek is 0.1 ppm. However, the technical limitations associated with the dredging process may make it impossible to achieve 0.1 ppm in these sediments.

Sediments with PCB concentrations above 500 ppm will be incinerated. Sediments contaminated with PCBs below 500 ppm will be biologically treated to destroy PCBs.

Monitoring will be conducted during dredging to determine the efficiency of the process as well as to monitor potential impacts of dredging. This will include monitoring of the St. Regis Mohawk Reservation public water supply since the water intake for this system is downstream of the sediment dredging area at the Site.

AREA 2: NORTH AND EAST DISPOSAL AREAS, RESERVATION SOILS, AND SOILS ON G.M. PROPERTY

The preferred remedial alternative for these areas is solids excavation and on-site treatment. The cleanup level for all soils, sludge, and debris in the North and East Disposal Areas and on the G.M. property is 10 ppm PCBs. This level is based, in part, on the Toxic Substances Control Act (TSCA) PCB spill cleanup policy and on requirements submitted by New York State. The cleanup level for soils on the Reservation is 1 ppm PCBs. This level is based on requirements submitted by the St. Regis Mohawk Tribe.

All soils, sludge, and debris with PCB concentrations above 500 ppm will be incinerated. Material contaminated with PCBs below 500 ppm will be biologically treated to destroy PCBs.

AREA 3: INDUSTRIAL LANDFILL

As part of its decision-making process, EPA is soliciting comment on the alternatives presented for cleaning up the Industrial Landfill. EPA will propose an alternative after evaluating public comment on the alternatives presented in this Plan.

Costs (presented on previous pages in tabular form) for capping or excavating and treating the landfill range from $3,000,000 to $202,000,000. At present, the Industrial Landfill poses an estimated 2.9×10^{-6} cancer risk to the adult Indian population. After installation of a composite cover, it is estimated that the Industrial Landfill would pose a 2.9×10^{-8} cancer risk to the adult Indian population. After excavation and incineration of the Industrial Landfill, cancer risks to the adult Indian population would be approximately 3.7×10^{-6}. This risk could be lowered through relocation of nearby residents during incineration. Risks to Indian children are lower than risks to Indian adults.

AREA 4: INDUSTRIAL LAGOONS

The preferred remedial alternative for the lagoons is solids and sludge excavation with on-site treatment. The cleanup level for the lagoons is 10 ppm PCBs. This level is based, in part, on the TSCA PCB spill cleanup policy and on requirements submitted by New York State. Excavated material will be pre-treated, as necessary, to remove metals. Material contaminated with PCB concentrations above 500 ppm will be incinerated. Material contaminated with PCBs above 10 ppm and below 500 ppm will be biologically treated to destroy PCBs. If biological treatment does not result in PCB concentrations below 2 ppm, the lagoon material will be further treated to achieve 2 ppm by other methods such as chemical extraction or thermal destruction.

AREA 5: GROUNDWATER

The preferred remedial action for groundwater is groundwater recovery and treatment. Groundwater will be treated to PCB levels of 0.1 ppb, based on State requirements. Other contaminants will be treated to levels which comply with federal requirements and State requirements which are more stringent than federal requirements.

COSTS ASSOCIATED WITH THE PREFERRED ALTERNATIVE

The estimated total capital cost of EPA's preferred alternative is $135,000,000. Annual operation and maintenance costs are $464,000 for the first six years and $197,000 for the following 24 years. The total present worth of the preferred alternative is $138,000,000. This is based on a 10% annual interest rate, a 30 year period of performance for groundwater recovery and treatment and a 6 year period of performance for solids treatment. These costs do not include costs associated with remediation of the Industrial Landfill.

TESTING OF BIOLOGICAL TREATMENT

The contaminated soils, sludges, debris and sediments at the Site will be excavated and dredged, with treatment by a combination of thermal and biological destruction. Those materials at levels over 500 ppm PCBs will be incinerated, while those materials at concentrations of less than 500 ppm PCBs will be treated by a biological degradation process.

In order to determine the effectiveness of the innovative biological degradation process at the G.M. Site, pilot treatability studies will be performed. At the conclusion of the treatability studies, EPA will evaluate the effectiveness of biological treatment for the materials at concentrations below 500 ppm PCBs. For all areas, except the Industrial Lagoons, biological treatment must result in a PCB concentration of less than 10 ppm for the treatment to be considered successful. For Industrial Lagoon material, biological treatment must result in a PCB concentration of less than 2 ppm for the treatment to be considered successful. If biological treatment cannot achieve these goals, PCB contaminated material may be treated with an alternative treatment technology such as chemical extraction or thermal destruction.

COST ANALYSIS OF PREFERRED ALTERNATIVE

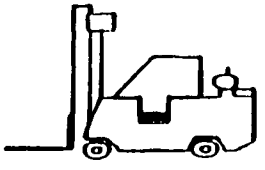
	Construction* Cost ($M)	Annual Operation** & Maintenance ($K/yr)	Total Present Worth ($M)
AREA 1: CONTAMINATED RIVER AND TRIBUTARY SEDIMENTS			
Sediment Dredging with Biological Treatment of Sediments with PCBs Concentrations Below 500 ppm and Thermal Destruction of Sediments with PCB Concentrations Greater than 500 ppm	21.5	24	21.5
AREA 2: NORTH AND EAST DISPOSAL AREAS, RESERVATION SOILS, AND SOILS ON G.M. PROPERTY			
Soils, Sludge, and Debris Excavation with Biological Treatment of Solids with PCB Concentrations Below 500 ppm and Thermal Destruction of Solids with PCB Concentrations Greater than 500 ppm	86	267	87
AREA 4: INDUSTRIAL LAGOONS			
Solids and Sludge Excavation with Biological Treatment of Solids and Sludges with PCB Concentrations Between 10 ppm and 500 ppm and Thermal Destruction of Solids and Sludges with PCB Concentrations Greater than 500 ppm	47	267	48
AREA 5: GROUNDWATER			
Groundwater Recovery and Treatment	2	197	4
TOTAL*	135	464 (6 years) 197 (following 24 years)	138

* These total costs reflect the cost savings which result from treating areas 1, 2, and 4 at the same time. See cost discussion on page 19 for further explanation of these costs.

REMEDIATION PROCESS DIAGRAM

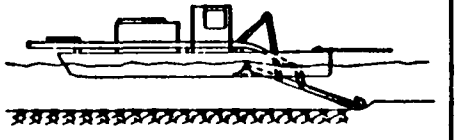
BRIEF DESCRIPTION OF PREFERRED ALTERNATIVES FOR SOLIDS

SOLIDS EXCAVATION



Excavation involves the removal of contaminated material using either standard construction equipment or special equipment adapted to reducing disturbance of waste.

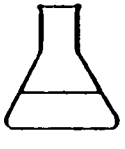
SEDIMENT DREDGING



Dredging is a special type of excavation performed through water requiring equipment that may be mounted on a barge if the water depth exceeds the reach of construction equipment.

ON-SITE TREATMENT

- Thermal extraction solidification, and destruction



- Biological destruction
- Chemical extraction and destruction

RATIONALE FOR RECOMMENDATION

This section briefly describes how each of the alternatives were evaluated against the Nine Criteria.

Overall Protection of Human Health and the Environment

Except for the no action alternative, each of the alternatives for the various contaminated areas, if properly operated and maintained, protects human health and the environment.

Compliance with Applicable, Relevant, and Appropriate Requirements (ARARs)

Actions taken at any Superfund site must meet all applicable or relevant and appropriate requirements of federal, State, and Tribal laws or provide grounds for waiving these requirements. The No-Action alternative does not comply with ARARs.

Major Federal ARARs

The Toxic Substances Control Act (TSCA) is a federal law which regulates the disposal of PCBs. In general, depending on the nature of the PCB containing material and the PCB concentration in the material, TSCA may require incineration or disposal in a chemical waste landfill approved for PCB disposal. PCBs that are required to be incinerated may also be disposed of by an approved alternate method that provides PCB destruction equivalent to incineration. The TSCA regulations are applicable to the disposal of the soil, sludges, debris and river sediments once they have been excavated and dredged during cleanup.

Treatment alternatives for the sludges, soils, and sediments involve the use of innovative technologies, such as biological treatment, to treat those materials with PCB concentrations below 500 ppm. It appears that TSCA regulations would require that innovative treatment of the Industrial Lagoon sludges must be equivalent to incineration and must therefore reduce PCBs to concentrations no greater than 2 ppm after treatment.

According to EPA's treatment goals for the Site, any innovative treatment (including biological treatment) of areas, other than the Industrial Lagoons, must remove PCBs to concentrations below 10 ppm. Unless innovative treatment (e.g., biological treatment) of PCB contaminated materials reduces PCB concentrations to levels below 2 ppm, the residuals from the innovative treatment process will be disposed of in an on-site TSCA chemical waste landfill. However, under TSCA, EPA is proposing to waive certain TSCA chemical waste landfill requirements if the residuals from the innovative treatment process do not present an unreasonable risk of injury to health or the environment from PCBs.

Portions of the Resource Conservation and Recovery Act (RCRA) which are relevant and appropriate to the proposed remedy for the Site will be met by all alternatives. These requirements include RCRA groundwater monitoring requirements, RCRA closure requirements, RCRA storage requirements, and RCRA incinerator requirements. All alternatives, with the exception of No-Action and Capping of Solids with a Soil Cover, would comply with RCRA requirements.

Alternatives which involve groundwater treatment will comply with relevant and appropriate cleanup levels established under the Safe Drinking Water Act. Alternatives which involve actions in wetlands will comply with relevant and appropriate requirements of the Clean Water Act.

Major State ARARs

Major New York State ARARs which are relevant and appropriate to the alternatives being considered for this Site include State groundwater quality standards which will be met by the groundwater recovery and treatment alternative. Other State regulations governing wetlands, coastal management, and hazardous waste treatment, storage, and disposal requirements are relevant and appropriate to this action and will be met by all alternatives evaluated.

Major Tribal ARARs

The St. Regis Mohawk Tribe has submitted the following ARARs which are applicable to actions on the Reservation:

Soil	1.0 parts per million
Sediment	0.1 parts per million
Groundwater	10.0 parts per trillion
Surface Water	1.0 parts per trillion
Air	5.0 nanograms per cubic meter

For the remedial actions which will be conducted on the St. Regis Reservation, the Tribal ambient standard for soil will be achieved. As a cleanup goal, EPA will attempt to achieve the Tribal sediment standard of 0.1 ppm in sediments in the Raquette River and Turtle Creek. However, it may prove technically impracticable to achieve 0.1 ppm in these sediments due to limitations of dredging technology.

According to CERCLA Section 121(d)(4)(c), EPA may select a remedial action that does not attain an ARAR if compliance with the ARAR is technically impracticable from an engineering perspective. Based on previous experience at other Superfund sites and federal projects, dredging to 0.1 ppm may be technically impracticable. Therefore, EPA is proposing to waive the Tribal sediment standard where it is technically impracticable to achieve. The ability to achieve 0.1 ppm PCBs in sediments will be evaluated during the dredging process, taking into account the demonstrated technical limitations of the dredging equipment.

Long-Term Effectiveness and Permanence

The No-Action Alternative would not provide long-term effectiveness in protecting human health and the environment. In general, containment and capping remedies provide a lesser degree of permanence in remediating contamination at the Site. Sediment containment with a graded cover would reduce the erosive force of the flowing river water and would limit movement of contaminants into the environment; however, it is less permanent than sediment removal through dredging. The long-term effectiveness of groundwater containment or recovery and treatment would be reduced if the slurry wall or the recovery well system fails. Groundwater containment or recovery and treatment would reduce the risk from direct ingestion of the contaminated surface water.

With respect to the treatment alternatives, thermal destruction is a permanent and effective technology since it results in destruction of PCBs. Chemical extraction, biological treatment, chemical destruction and thermal extraction technologies have the potential to permanently remediate the Site; however, some uncertainties exist. A pilot study would be necessary during the design phase to ensure long-term effectiveness of these alternatives.

On-site disposal without treatment would not implement any permanent treatment technologies and is less effective in the long-term than treatment and disposal. Regardless of which remedial alternative is implemented, some monitoring would be essential to ensure long-term effectiveness.

Reduction of Toxicity, Mobility or Volume

The No-Action Alternative would not reduce toxicity, mobility or volume of the contaminated material.

Although capping and containment alternatives would reduce the mobility of contaminated material, no treatment would be performed. Groundwater alternatives would reduce the mobility of the contaminated groundwater; groundwater treatment may also reduce the toxicity and volume of the contaminants in the treated groundwater.

Solids and sludge treatment alternatives involve excavation and subsequent treatment of the excavated materials. Biological treatment, chemical destruction, chemical extraction, thermal destruction or thermal extraction would reduce the mobility, toxicity and volume of the contaminated material. A combination of thermal treatment (materials over 500 ppm) and biological treatment (materials below 500 ppm) would reduce the mobility, toxicity and volume of the contaminated material.

Sediment dredging and treatment of the dredged material with one of the treatment methods outlined above, would reduce the mobility, toxicity and volume of the contaminated river sediments. On-site disposal without treatment would reduce only the mobility of the contaminated material.

Short-Term Effectiveness

The No-Action Alternative does not provide short-term effectiveness, as the contaminated groundwater and solids remain at the Site. Site capping, would involve an increase in dust during construction; however, the contaminated soils would remain relatively undisturbed.

The area on the St. Regis Reservation may be impacted by excavation; precautions to minimize potential impacts will be included in the design phase for the remediation for the Site. Groundwater alternatives do not pose significant implementation problems.

Soil and sludge treatment alternatives will immediately reduce the potential for direct contact with hazardous materials upon initiation of the remedial action. Community and worker exposure would be minimized by the use of construction methods that minimize air emissions and surface water runoff; also, protective equipment that minimizes workers' contact with the contaminated materials would be utilized. Air quality will be monitored during remediation.

Completion of pilot treatability studies, remedial design and construction will take up to two years. The time to complete a biological treatment process for all areas except the Industrial Landfill is estimated to be five years from completion of construction of the treatment units. Chemical destruction of all of the contaminated material would take approximately six years from construction completion, assuming a treatment rate of 175 cubic yards per day.

Utilizing five treatment units after construction completion, the chemical extraction alternative would require five years for treatment of all areas assuming each unit processed 49 cubic yards per day. Using the thermal destruction alternative for all of the contaminated material at the Site, the remedial action would take ten years to complete following construction, assuming a processing rate of 4.2 cubic yards per hour. The thermal extraction alternative would require approximately seven years for completion of the remedial action following construction, assuming a processing rate of seven cubic yards per hour. The solidification alternative, at a process rate of 200 tons per hour, would require approximately one year to complete following construction.

A combination of incineration for solids with PCB concentrations greater than 500 ppm and biological treatment for solids with PCB concentrations below 500 ppm would require five years to complete after construction, assuming biological treatment and incineration were implemented at the same time.

Sediment dredging would require approximately one year to complete. Implementation of sediment dredging would require extensive controls to minimize sediment redeposition in the river.

On-site disposal without treatment would require use of construction and protective methods to minimize community and worker exposure and would also necessitate the use of controls to minimize sediment redeposition.

Implementability

All of the alternatives are implementable from an engineering standpoint. However, there are some inherent difficulties which may be encountered during implementation of some alternatives.

Technological limitations may affect the efficiency of dredging as a means of removing contaminated sediments since some sediments will be resuspended during the dredging process. As mentioned in the discussion on short-term effectiveness, each of the alternatives would require the development of a health and safety plan to minimize worker and community exposure during implementation.

Treatment alternatives will require treatability studies to optimize the design and operating parameters for the treatment system. These treatability studies will determine the implementability of innovative technologies such as biological treatment. If innovative technologies

are not found to be implementable, other more proven technologies, such as incineration, would be used to treat soils, sludges and sediments.

Cost

The costs associated with the alternatives for each disposal area are presented in tables on previous pages. These costs are estimates and may change as a result of design and construction modifications.

Capital costs include fixed costs (costs associated with equipment mobilization and site preparation) and non-fixed costs (costs associated with treatment of a specific disposal area). Capital costs are only incurred once for each treatment technology. Thus, significant savings (in fixed costs) from those costs displayed in the tables will result whenever the same treatment technology is used for two different disposal areas.

For example, the capital costs associated with thermal destruction of Area 4, the Industrial Lagoons, are $47,000,000. The capital costs associated with a combination of biological and thermal destruction of Area 4 are $46,000,000. However, the preferred remedy provides for a combination of biological treatment and thermal destruction for several disposal areas at the Site, thereby saving fixed costs. The one-time fixed costs for biological treatment are approximately $14,100,000. The one-time fixed costs for incineration are approximately $6,400,000. The non-fixed costs for incineration of lagoon materials are approximately $15,000,000 greater than the non-fixed costs for a combination of incineration and biological treatment of lagoon materials.

State, Tribe and Community Acceptance

These criteria will be addressed at the close of the public comment period by considering comments from the State of New York, the St. Regis Mohawk Tribe and the public.

SUMMARY OF RATIONALE FOR RECOMMENDED ALTERNATIVE

The proposed remedy for the Site is protective of human health and the environment and affords a high degree of long-term effectiveness and permanence while utilizing treatment as a principal element. The treatment process provided for in this proposed plan would be designed to meet ARARs, where possible. The preferred alternative provides the best balance among the alternatives with respect to the criteria used to evaluate the alternatives. Moreover, this combination of alternatives would satisfy the statutory preference for remedies which utilize treatment as a principal element and for permanent remedies. Selection of this combination also allows for implementation of an innovative treatment technology (biological treatment). This combination of alternatives is also the lowest cost combination of alternatives which is protective of human health and the environment and utilizes highly permanent treatment technologies as a principal element.

Biological treatment alone is less expensive than the proposed remedy but biological treatment is not considered effective for material with PCB concentrations above 500 ppm. Chemical and thermal extraction technologies are less expensive than the selected remedy for some areas of the Site. However, extraction technologies result in an extract with a very high PCB concentration which must be further treated before it can be disposed. Solidification is less expensive than the selected remedy, however, solidification offers a much lower degree of permanence than the proposed remedy since PCBs are still bound within the solidified material.

Glossary

- **Aquifer**

An underground rock or soil foundation that is capable of supplying water to wells and springs.

- **Feasibility Study (FS)**

The second part of a two-part study Remedial Investigation/Feasibility Study (RI/FS). The Feasibility Study involves identifying and evaluating the most appropriate technical approaches for addressing contamination problems at a Superfund site.

- **Ground Water**

Water that fills spaces between sand, soil rock and gravel particles beneath surface of the earth. Rain water that does not evaporate or drain to surface water such as streams, rivers, ponds, or lakes, but slowly seeps into the ground, forming a ground water reservoir. Groundwater flows considerably more slowly than surface water, often along routes that lead to streams, rivers ponds, lakes and springs.

- **Hydrogeologic**

A word in reference to the science of hydrology, which studies the interactions among surface water, ground water, and the earth's rocks and soils.

- **National Priorities List (NPL)**

A roster of uncontrolled hazardous waste sites nationwide that pose an actual or potential threat to human health or the environment, and are eligible for investigation and cleanup under the federal Superfund program.

- **Plume**

A defined area of ground water contamination believed to have originated from a known source.

- **Proposed Plan**

A document that describes all the remedial alternatives considered by U.S. EPA for addressing contamination at a Superfund site, including the preferred U.S. EPA alternative.

- **Remedial Action**

A series of steps taken to monitor, control, reduce or eliminate risks to human health or the environment. These risks were caused by the release or threatened release of contaminants form a Superfund Site.

- **Remedial Alternative**

A combination of technical and administrative methods, developed and evaluated in the Feasibility Study, that can be used to address contamination at a Superfund site.

- **Remedial Investigation (RI)**

The first part of a two-part study Remedial Investigation/Feasibility Study. The Remedial Investigation involves collecting and analyzing technical and background information regarding a Superfund site to determine the nature and extent of contamination that may be present. The investigation also determines how conditions at the site may affect human health the environment.

- **Responsiveness Summary**

A Section within the Record of Decision that presents U.S. EPA's responses to public comments on the Proposed Plan and RI/FS.

- **Sediment**

Mud, Sand, gravel, and decomposing animals and plants that settle to the bottom of surface water.

- **Superfund**

The common name for the federal program established by the Comprehensive Environmental Response and, Liability Act (CERCLA) of 1980, as amended on 1986. The Superfund law authorizes U.S. EPA to investigate and cleanup the nations most serious hazardous waste sites.

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APPENDIX B

PUBLIC NOTICE PUBLISHED IN THE
MASSENA DAILY COURIER-OBSERVER NEWSPAPER
ON MARCH 21, 1990

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ANNOUNCES
PROPOSED REMEDIAL ALTERNATIVES FOR THE
GENERAL MOTORS CORPORATION-CENTRAL FOUNDRY DIVISION SITE
St. Lawrence County, Massena, New York

The U.S. Environmental Agency (EPA) recently evaluated alternatives for cleaning up the contaminated soils, lagoon sludges, river sediments, wetlands and groundwater associated with the General Motors Corporation-Central Foundry Division Superfund Site. As part of its public participation responsibilities under section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), EPA is issuing a Proposed Plan for public comment which summarizes EPA's proposed plan for cleaning up the Site as well as the other alternatives considered for Site cleanup.

The public comment period for this Site is from March 21, 1990 to May 21, 1990. EPA will hold a public meeting on its proposed plan on **April 25, 1990 at the St. Regis Mohawk School in Hogansburg, New York.** Comments received during the public comment period and at the public meeting will be considered in selecting the final cleanup plan for the Site. EPA has evaluated a variety of alternatives to cleanup the Site. The alternatives for the Site areas are listed below:

AREA 1: Contaminated River and Tributary Sediments: No action; In-place containment of river sediments; Sediment dredging and on-site treatment.

AREA 2: North and East Disposal Areas, contaminated soils on the St. Regis Mohawk Reservation, contaminated soils on G.M. Property: No action; Capping of North and East Disposal Areas; Excavation and on-site treatment of solids; Excavation and on-site disposal of solids.

AREA 3: Industrial Landfill: No action; Capping of Industrial Landfill; Excavation and on-site treatment of solids; Excavation and on-site disposal of solids.

AREA 4 On-site Lagoons: No action; Lagoon solids excavation and on-site treatment; Lagoon solids excavation with on-site disposal.

AREA 5: Groundwater: No action; Groundwater containment; Groundwater recovery and treatment.

EPA's preferred alternative for Areas 1,2 and 4 is sediment dredging and solids excavation followed by a combination of biological treatment and thermal destruction. EPA's preferred alternative for Area 5 is groundwater recovery and treatment. EPA has not specified a preferred alternative for the Industrial Landfill; rather EPA will be soliciting comment on the Area 3 alternatives. Information regarding the preferred alternative as well as the other alternatives will be discussed at the public meeting. Also, detailed information on these alternatives is available for review in the Proposed Plan and Remedial Investigation and Feasibility Study Reports (RI/FS) which are located at the following repositories:

United States Environmental Protection Agency
26 Federal Plaza, Room 747
N.Y, N.Y. 10278

St. Regis Mohawk Indian Reservation
Community Building
Hogansburg, N.Y. 13655

Massena Public Library
14 Glen Street
Massena, N.Y. 13662

Written comments on the proposed alternatives should be sent to:

Lisa Carson, Project Manager
U.S. Environmental Protection Agency
26 Federal Plaza, Room 747
New York, New York 10278

APPENDIX C

SIGN-IN SHEETS FROM THE APRIL 25, 1990 PUBLIC MEETING
AND THE APRIL 26, 1990 AVAILABILITY SESSION
HELD IN MASSENA, NEW YORK

UNITED STATES PROTECTION AGENCY
REGION II
PUBLIC MEETING
FOR
GENERAL MOTORS - CENTRAL FOUNDRY DIVISION
MESSENA, NEW YORK

APRIL 25, 1990
ATTENDEES

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NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
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Holly Moser	232 Lehman W. S.V.C.P.	Potsdam NY	"	268-3385		~~no~~ yes
JOHN MCCANN	335 LEHMAN E.	POTSDAM, NY	13676	—		no
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Suna Stom	Box 1846 SLU	CANTON NY	13617	379-5778		No
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Dwight Tuinstra	PO Box 427	Potsdam NY	13676	265-4195		Yep!
JON MONTAN	Rt. 2 Box 246	CANTON NY	13617	315 379-9218	SELF	yes
Keith Zimmerman	St. Law. Co. Planning	Canton, N.Y.	13617	315 379-2292		NO
JAMES HANNON	Box 503 SLU	"	"	(315)379-6394		YES.
TERRY JORDAN	28 N. ALLEN ST.	MASSENA	13662	769-6688		Yes
Marilyn Mackie	Box 1621 St. Lawrence	Canton NY	13617	—		Yes
Jean Zyzik	3 Riverside Pkwy	Massena	13662	769-7176		yes
Stephanie LeGros	~~CRAD~~ Box 1611, SLC	Canton	13617	3796075	planet earth	no

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Barb Wheeler	43 Clarkson	Massena	13662	315-769-3907		yes
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DAN BRONCHETTI	11 PINE ST.	MASSENA	13662	769-6514		
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Barbara Wood	Rte 1, Box 6	Waddington	13694	315 388 9824	—	yes
Robin Embody	Meadow East M7	Potsdam	13676			yes
Donald F. Smith	HC61 Box 432	MASSENA	13662	315-769-3311	County Legislature	yes
Mike St Thomas	RR#1 Box 510	MASSENA	13662	764-0741	GENERAL FOUNDRY	yes
* Keith Beebe	10½ Leroy	Potsdam	13676	265-2062	Self	yes
Cheeta Lyons	411 S Main St	Massena	13662	—	self	yes
FRANK ALGUIRE	41 MAIN ST. (P.O. Box 463)	MASSENA	13662	315-769-8484	MASSENA ECON DEV'T COUNCIL	YES
Chris Neurath	RD1, Box 123A	Richville NY	13681	315-347-2427	self	yes
DUANE T. HAZELTON	TOWN HALL	MASSENA	13662	315-769-3588	TOWN of MASSENA	YES

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Kay Rykowski	Rt 1 Box 12-B	Mt Dora, Fl	32757	(904) 383 3932	Akwesasne Task Force	Y
Bob Herczak	205 Amelia	Cornwall, Ont.	K6H 2X2	613-938-[illegible]	Environment Ontario	Yes
Mary Stillson	Metuchen NJ	Metuchen	08840	(201) 321-6683	US EPA	NO
Don Schiemann	110 Baldwin	Birmingham, MI	48009	(313) 974-1734	GM	YES
Joe Medved	3464 Norway Lane	Columbiaville, Mich	48421	(313) 793-2464	GM	YES
[illegible]	RD1 Box 103	[illegible]	NY	315-[illegible]	NYSDEC	Yes
Darrell Sweredoski	4 RD# 2	Watertown	NY	315 785 2513	NYS DEC	[illegible]
D.A. Dix	45 [illegible]	Massena	NY	315-764-1125		
Alice Zivin	Rt Box 119	Norwood	NY	353-2480		
Fred Fellows	44 Spring St.	Norwood	NY	353-2582		Yes
Jim Robert	RT3 Box 31	Massena	N.Y.	769-7516		YES
Bernice Robert	Rt 3 Box 31	Massena	NY	769-7516		Yes

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NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
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Robert Klein	46 N Main	Norwood	13668	315/353-2104		Yes
Diana Anderson	300 Caldwell Hall	Ithaca	14853	607/255-1971	Cornell Univ. Amer. Ind. Proj	Yes
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Carrie Johns	Rt 1 Box 156A	Madrid	13660	315/388-4386		yes
Liz Bassano	4072 Bowman South	Potsdam	13676	315/268-3493	Potsdam (SUNY)	Yes
Mary D Booth	Box 54 SLU	Canton	13617		EAD SLU	NO
Andrea M Freeman	Box 810 SLU	CANTON	13617	315-379-6250	ME	yes
Elizabeth McDowell	Box 1647 SLU	Canton	13617	315-379-7848		NO
Bradley A. Welch	Box 2167 SLU	Canton	13617	315 379-6812		Yes
Mary Burns Vermeuse	Planning Office	Canton	13617	(315)379-2272	St Lawrence EMC	yes
Betty Bradley	Courthouse	Canton	13617	(315)379-2276	St Lawrence Bldg Insp	yes
Patrick Brancatti	Box 500 S Greasse Rd	Massena	13662	(315)764-0204	Reynolds Metals	Yes
Philip Fidanza	25 Miller St	Massena	13662	(315)769-6688		YES

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NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
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PATRICIA FRANCIS	" " "	"	"	"		✓
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Jennifer Dallas	212 Draime (Chap)	Potsdam	13676		self	✓
Kevin LaMontagne	243 Draime SLCP	"	"	—	self	✓
Diana Marcil	1633 St. Lawrence U.	Canton	13617	379-7383	self	✓
Kim Schuyler	41 Lincoln	"	"	379-6812	"	—
Gregory Berot	58 Park St.	Canton	13617	274-5778	"	✓
Mike Kadlec	Box 1566 SLU	Canton	13617	—	"	
Maria Brent	Box 1724 SLU	Canton	13617	379-6244	"	
David Lamantia	3 Pierrepont Pl	Canton	13617	386 1342	"	

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David Pelton	Rt. 1 Box 93	Massena	13662	769-3351		
DA Schmidt	PO Box 460	Massena	13662	764-2202	GM	
Carl Sorrentino	Ransom Ave	"	"	769-2693		
Barbara B. Hart	Rt. #2-264	Massena	13662	764-6546		
Rene P. Hart	Rt #2-264	Massena	13662	764-2257	TOWN COUNCIL CENTRAL FOUNDRY	
James W Gillett	150 Brodick Hill Rd	Ithaca, NY	14850	607-2722443	—	
Barbara D Lynch	1047 Snyder Hill Rd	Ithaca NY	14850	607 255-2808	—	yes
Bruce A. Pendergraft	Rt 1 Box 113	Madrid, NY.	13660	315-322-4147		NO
Ken Jock	Community Bldg.	Hogansburg, NY	13655	518-358-2272	St. Regis Mohawk Tribe	
F. HENRY LICHER	MOHAWK	Council of Akwesasne		613 575-2250	MCA	YES
Stephen Pennington	Rte 56, H.C. 61	Massena	13662	769-7400		
Laura Parker	S.L.U.	Canton	13617	379-6131		

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R Tarelli	6607 Taylor	E Syracuse	13057	—	GAC	YES
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Klaus Praemin	130 Miner St	Canton	13617	379-9506		yes
Todd Alessi	Box 268 W, 5th St	Russell	13654	347-3660		Yes
Lon McNeilly	2 Windsor Rd.	Massena	13662	769-7032	Central Labor Council	yes
Charles B Ronzi	23 Morris Pkg	Massena	13662	769-2552	St Law. Co.	yes.
Gerald F Morse	Box 123	Norfolk	13667	769-9480	St Law Co	yes.
JOHN R. FEELEY	5 WESTWOOD	MASSENA	13662	769-8854	Village of Massena	"
W. H Daley	R 1 Box 485	Colton	13625	265-2414	self	NO
James A Tetu	11 Baldwin Ave	Massena	13662	769-2255	Self	Yes
Doug Premo	2 Ransom Ave	Massena	13662	769-2693	GM + self	yes
Jim Carney	RD #1	Brasher Falls	13613	389-4752	St-Ct Leg	yes
Rahul Rana	321, Dryden Rd Ithaca, NY		14850	607 255-9008	Cornell Univ.	yes.
Bill Moon	Ogdensburg Bridge & Port Authority	Ogdensburg	13669	393-6884	Tetra Tech	yes

UNITED STATES PROTECTION AGENCY
REGION II
PUBLIC MEETING
FOR
GENERAL MOTORS - CENTRAL FOUNDRY DIVISION
MESSENA, NEW YORK

APRIL 25, 1990
ATTENDEES

(Please Print)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
Hungry Oak	Box 52	W. Stockholm	13696		EARTH	Yes
Mick Oak	Box 52	W. Stockholm	13696			Yes
Chris Ingerson	St. Lawrence U. Box 1556	Canton	13617	379-7413	St. Lawrence U	Yes
Kristen Sayers	St. Lawrence U. Box 1505	Canton	13617	386-3114	SLU	NO
Dawn Webster	" Box 2014	"	"	379-6262	"	"
Kristen S Boysen	PO Box 298	Paresville	13672	265-6927	self	yes
John Lease	PO Box 150	Massena	13662	764-4113	Alcoa	yes
Mary Logan	PO Box 185	Waddington	13694	398 5960	Work on Waste	yes
Ingrid J. Thompson	Rt 1	Madrid	13660	322-8923	"	yes
Luke Daley	RD1 Box 485	Colton	13625	265-2404	League of Women Voters	Yes
Elizabeth N Weitzman	14 Crawford St	Potsdam	13676	265-3365	Citizen Act	yes
Tobi McCall	PO Box 38	Potsdam	13676	265-6375	St. Lawrence River Restoration Council	✓
Tom Cornell	Watertown Times Box 601	Massena	13662	769-6621	Watertown Times	✓
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Massena NY	✓

UNITED STATES PROTECTION AGENCY
REGION II
PUBLIC MEETING
FOR
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MESSENA, NEW YORK

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ATTENDEES

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NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
Russ Puckett	10 Warren Ave	Massena	13662	3157693831	—	✓
[illegible]	9003 [illegible]	[illegible]	37027	371-7733	BGI	
Pat Parker	PO Box 700	Massena	13662	315/764-0226	NYPA	✓
Elisabeth Gg	P.O. Box 556	Waddington	13694	315-388-7744	Engraf	
Tony D. Tullio	56 Minnie	Massena	13662	315-769-0491	—	—
Dennis G Avery	RR1 Box 326	Massena	13662	315-769-3256	Louisville	✓
renee annetters	12 monroe st.	malone	12953	518-483-6076	self	✓
Edward J. Fay	41 Ramon	Massena	13662	315-769-8461	Self	✓
BARRY DIETLEIN	RT 2	BRASHER FALLS	13613	315-769-2095	citizen	✓
S. R. MATZAN	195 E. HATFIELD	MASSENA	13662	769-7210	ZIAN	✓
Russell Nelson	11 Grant St.	Potsdam	13676	265-5655	me	
[illegible]	122 CHAT [illegible]	Fort Covington	12937	—		✓
Herman T Bond	14 Chestnut	Massena	13662	769-3778	—	✓
[illegible]	36 [illegible]	Massena	13662	769-7688	St. Lawrence County	✓

UNITED STATES PROTECTION AGENCY
REGION II
PUBLIC MEETING
FOR
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MESSENA, NEW YORK

APRIL 25, 1990
ATTENDEES

(Please Print)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
Ed Lynch	LAKE PLEASANT	LAKE PLEASANT	12108		Rachel Carson Council	✓
Shawn A. Eccleston	RD1 Box 80	Wintonville, NY.	13697	764-4463	ALCOA	X
Tom Daly	1 Commerce St.	Ogdensburg NY	13669	393-1484	SLC EMC/SR	✓
Lewis Cyr	Box 556	Waddington	13694	388-7744	Self	✓
JILL BERGIT	HCR 64-2A	Potsdam	13676	265-0324	Self	✓
Nancy E Cohen	P O Box 1759	MASSENA	13662 NY	764-1028	Self	
T.C. LIGHTFOOT	75 WESTWOOD DR	Massena	NY	764-2815	self	✓
Paul Huggett	~~Homedgett~~	Massena	NY	769-3545 ~~764-5448~~	LWVSA	
R. Shawn Sieg	56 E. ORVIS	MASSENA	13662	769-7156	MASSENA CRC	✓
A. Cuthbert	GROUSEHILL	Morristown				
Peter Hixson	21 W Main St	Canton NY	13617	379-0941	student for a clean environment	✓
Betsy Huntington	38 E. Main St	Canton NY	13617	379-6674	myself	✓
Joe Parent	5192 Shamrock St	Montreal	H1T 3A3	273-8154	Env. Quebec (ELPSC)	✓

UNITED STATES PROTECTION AGENCY
REGION II
PUBLIC MEETING
FOR
GENERAL MOTORS - CENTRAL FOUNDRY DIVISION
MESSENA, NEW YORK

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ATTENDEES

(Please Print)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
MARK BRODFUEHRER	55 CLARKSON	MASSENA	13662	764 1817	SELF/CAD	
DAVID MCLELLAN	6 ROCKLAND	MASSENA	13662	764-0642	St. Law Cty	
Roy Rutherford	162 E. ORVIS ST	Massena NY	13662	764-8554	W/GG	Q
Daniel Jordan	4415 St. Famille	Montreal Canada	H2J 3E9	1-514-844-5477	SLP	X
H. SMITH	26 HOWARD	MASSENA	13662	315 764 0419	SELF	X
CHARLES BOOT	53 Beaver Ave.	Massena	13662	769-8725	Village of Massena	
P.D. RICCIARDI	P.O. BOX 2035	BRENTWOOD TN	37024	615-377-7733	GCI	X
JOHANNE LEGAULT	3900 Rue HARLY Box 22	QUÉBEC, QUÉ	G1X 4E4	418-646 0849	MINISTERE DE L'ENVIRONNEMENT DU QUEBEC	X
MICHAEL HENDERSON	46 Windsor Rd	MASSENA NY	13662	315-764-1452	GM/GCFD	
[illegible]	BOX 1732 CMR	Canton NY	13617	315 386-1542	SELF	
Anne Gillespie	5199 Sherbrooke St. # 2881	Montreal, Quebec	H1T 3X3	514-873 9148	*Quebec Environment Ministry	✓
Michael Goff	25 St Clair Ave E	Toronto Ont	M4T1M2	973 6182 (416)	Environment Canada	
Elie Fédida	5199, Sherbrooke Est #2881	Montréal	H1T3X3	(514) 873-5173	Environnement Canada	✓

UNITED STATES PROTECTION AGENCY
REGION II
PUBLIC MEETING
FOR
GENERAL MOTORS - CENTRAL FOUNDRY DIVISION
MESSENA, NEW YORK

APRIL 25, 1990
ATTENDEES

(Please Print)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
Kurt Eberlund	4337 Westover Pl	WASH DC	20016	—	—	X
Stephen Hammond	50 WOLF RD Rm 222	Albany NY	12233	518-457-5637	NYSDEC	X
Lisa Rodriguez	50 WOLF Rd Rm 324	Albany NY	12233	518-457-5637	NYSDEC	No

UNITED STATES PROTECTION AGENCY
REGION II
PUBLIC AVAILABILITY SESSION
FOR
GENERAL MOTORS - CENTRAL FOUNDRY DIVISION
MESSENA, NEW YORK

APRIL 26, 1990
ATTENDEES

(Please Print)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
FRANK ALGUIRE	41 MAIN ST. / P.O. Box 463	MASSENA	13662	315-769-8484	M.E.D.C.	
JON MONTAN	Rt. 2 Box 246	CANTON	13617	315 379-2292		
F. HENRY LICKERS	MOHAWK COUNCIL of AKWESASNE		613-5752250		MCA	YES.
Hank Appleton	Akwesasne T.F.	Cuyler NY	13050	315-445-0814	PA.	No
Dave Hemo	2 Rawson Ave	MASSENA	13662	315-769-2693	GM	YES
Ken Jock	Community Bldg.	Hogansburg	13655	518-358-2272	St. Regis Mohawk Tribe	
Alan Thompson	71 main rd	Chateaugay NY	13621	315 764 7302		yes
Larry Hebert	15 Howard st	Massena NY	13662	315 769 5570		yes
Bobi McCall	POD 638	POTSDAM	13617	265-8875	So. Tuscarora Resto.	
Pat Carroll	HC61 Box 43C	Massena	13662	315-764-7412	Myself	

APPENDIX D

WRITTEN COMMENTS RECEIVED BY EPA DURING THE PUBLIC COMMENT PERIOD AND SUMMARIZED IN SECTION III OF THIS RESPONSIVENESS SUMMARY. EPA'S RESPONSES TO THE FOLLOWING COMMENTS ARE ALSO INCLUDED IN SECTION IV OF THIS RESPONSIVENESS SUMMARY.

DUE TO ITS SIZE,

THIS APPENDIX WAS NOT INCLUDED

WITH THIS COPY.